



ARCHITECTS

Triplex Center Renovations

Bid Package 017

Fort Bend Independent School District

FBISD 2023 Bond Program

CSP 25-005KB

Project Manual

Construction Documents

cre8 Project 23-006

24 October 2024: Issue for Bid

cre8 Architects
3815 Montrose Boulevard
Suite 123
Houston, Texas 77006

Triplex Center Renovation

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3815 Montrose Boulevard

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PROJECT

Triplex Center Renovations
Fort Bend Independent School District
FBISD 2023 Bond Program Bid Package 017
CSP 25-005KB

OWNER

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

ARCHITECT

cre8 Architects
3815 Montrose Blvd, Suite 123
Houston, Texas 77006
713.526.2738 telephone

CONSULTANTS

CIVIL ENGINEER

Auric Engineers LLC
1907 Sabine Street
Houston, Texas 77007
713.319.4420 telephone

MEP ENGINEER

CMTA Consulting Engineers, Inc.
2201 Timberloch Place
Suite 110
The Woodlands, Texas 77380
281.419.9899 telephone

TECHNOLOGY

Combs Consulting Group
1022 River Road, #2
Boerne, Texas 78006
210.780.7628



PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

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Fort Bend Independent School District

Competitive Sealed Proposal for

**BP017 Triplex Center Renovations
CSP 25-005KB**

**Package “A” Base Bid and all documents except Alternates & SBE documents.
DUE NO LATER THAN 2:00 PM Central Time (CST) December 5, 2024**

**Package “B” Alternates and Package “C” SBE
DUE NO LATER THAN
3:00 PM Central Time (CST) December 5, 2024**

**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/>

BP017 Triplex Center Renovations
CSP 25-005KB

BACKGROUND:

Fort Bend ISD (FBISD) is a K-12 public school district in Fort Bend County serving a student enrollment of over 80,000. 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 existing buildings 2 and 3 at the Triplex Center. The estimated construction cost of work for this project is **Seven Million, Two Hundred Fifty Thousand Dollars. (\$7,250,000.00).**

PRE-PROPOSAL CONFERENCE:

A pre-proposal conference is scheduled for **Thursday, November 7, 2024 at 2:00 PM** via 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 Opportunity Q&A section in Bonfire.

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

WALK SCHEDULE:

A pre-proposal walk is scheduled for **November 8, 2024 9:00 AM (CST)** at the Triplex Center, 550 Julie Rivers Drive, Sugar Land, TX. Attendance is highly recommended in order to have an understanding of existing site conditions and the project's scope of work.

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 Opportunity Q&A section in Bonfire before the deadline for questions due date and time **Thursday, November 14, 2024, 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://fortbendisid.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 <http://www.fortbendisid.com/docs/purchasing/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.

Scope of Work

FBISD is seeking a contractor to provide renovation work at the existing Triplex Center Buildings 2 & 3. The scope of work also includes but is not limited to the selective demolition and interior alterations as indicated in the construction documents.

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 projects at approximately \$5,000,000.

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

Senior Buyer: Kathleen Booker
Email: kathleen.booker@fortbendisid.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)	19 points
	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)	
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)	21 points
	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)	
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)	10/29/2024
2.	Job advertises (2 nd run)	11/5/2024
3.	Pre-Proposal Conference 2:00 PM (CST)	11/7/2024
4.	Pre-Proposal Walk 9:00 AM (CST)	11/08/2024
5.	Final Questions due 10:00 AM (CST)	11/14/2024
6a.	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.	12/5/2024
6b.	Proposal Package “B” Due 3:00 PM (CST) Alternates only	12/5/2024
6c.	Proposal Package “C” Due 3:00 PM (CST) SBE documents only	12/5/2024
7.	Presentation to Board of Trustees for contract award (Tentative, subject to change)	02/2025
8.	Tabulations and awards posted to https://fortbendisid.bonfirehub.com/portal/?tab=pastOpportunities	02/2025
9.	Substantial Completion of the Work	03/31/2026

SUBMISSION DEADLINE:

Fort Bend ISD will accept proposals submitted electronically through Bonfire e-bidding portal until **Thursday, December 5, 2024 2:00 PM CST**. <https://fortbendisid.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, December 5, 2024 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 1, 2022

Texas Gulf Coast Area

CLASSIFICATION	2022 HOURLY RATE
ASBESTOS WORKER	\$21.13
BRICKLAYER; MASON	\$25.32
CARPENTER; CASEWORKER	\$23.38
CARPET LAYER; FLOOR INSTALLER	\$25.12
CONCRETE FINISHER	\$23.40
DATA COMM/TELE COMM	\$23.50
DRYWALL INSTALLER; CEILING INSTALLER	\$26.65
ELECTRICIAN	\$25.93
ELEVATOR MECHANIC	\$28.80
FIREPROOFING INSTALLER	\$22.25
GLAZIER	\$22.30
HEAVY EQUIPMENT OPERATOR	\$22.40
INSULATOR	\$20.50
IRONWORKER	\$25.50
LABORER, HELPER	\$16.71
LATHERER; PLASTERER	\$23.25
LIGHT EQUIPMENT OPERATOR	\$20.50
METAL BUILDING ASSEMBLER	\$21.10
MILLWRIGHT	\$33.63
PAINTER; WALL COVERING INSTALLER	\$19.60
PIPEFITTER	\$26.97
PLUMBER	\$26.71
ROOFER	\$20.50
SHEET METAL WORKER	\$19.90
SPRINKLER FITTER	\$26.13
STEEL ERECTOR	\$23.25
TERRAZZO WORKER	\$23.50
TILE SETTER	\$19.58
WATERPROOFER; CAULKER	\$19.88

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

Prevailing Wage Rates 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.
MILLWRIGHT	Mechanic specializing in the installation of heavy machinery, conveyance, wrenches, dock levelers, hydraulic lifts, and align pumps.
PAINTER; WALL COVERING INSTALLER	Worker who prepares wall surfaces and applies paint and/or 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.

DOCUMENT 00 11 9 – FBISD REQUEST FOR COMPETITIVE SEALED PROPOSALS

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.



DOCUMENT 00 21 16 - INSTRUCTIONS TO BIDDERS

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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://fortbendis.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:
 - o the selection criteria in the request for proposal and the weighted value for those criteria in the request for proposal; and
 - o 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://fortbendis.d.bonfirehub.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.

<p>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.)</p>	<p>Contract Limit or Replacement Cost Value of Scope of Work whichever is greater</p> <p>Permission to Occupy granted</p> <p>Deductible: 1% of contract, \$50,000 maximum, unless otherwise approved by the Owner.</p>
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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 of 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 a 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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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 anyAll 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 though 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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Response.

- 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 of 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, 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.

DOCUMENT 00 31 13 - PRELIMINARY SCHEDULES

1.1 PROJECT SCHEDULE

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but do not affect Contract Time requirements. This Document and its appended attachment are not part of the Contract Documents.
- B. Available Project information includes the following:
 - 1. Owners Draft Project Schedule.
- C. Owner's Draft Project Schedule including design and construction milestones is appended to this Document.
 - 1. Draft schedule is intended to illustrate possible construction timing and sequence that meets Owner's needs and timing within the allocated construction duration while also taking into consideration school calendars. It is not intended to dictate construction sequence to proposing Contractors.
- D. Proposing Contractors shall develop and submit their own proposed construction schedule to be submitted as part of their proposal documents. Refer to instructions for additional guidance.
 - 1. Contractor's construction schedule must comply with the following scheduling guidelines.
 - a. No work may be scheduled during student's educational day.
 - b. Work involving the removal of doors, windows, wall surfaces or roofing assemblies which breach the building enclosure directly exposing the building interior to the exterior environment may only occur during breaks in the school calendar and all such work must be complete and restored to original conditions prior to restart of classes.
 - c. Work involving total or partial shut-down of cooling systems (cooling towers or chillers) may only occur during the heating season.
 - d. Work involving the replacement of air handling units may be done after school hours or over weekends or extended breaks in the school calendar provided that work is sufficiently complete to allow system operation 6 hours prior to recommencement of classes.
 - e. Active humidity control as necessary to prevent the growth of mold must be maintained at all times through the use of existing mechanical systems or Contractor supplied dehumidification units.
 - f. Work which disturbs existing fire rated assemblies and ceilings may not be undertaken during occupancy of the building by students and all fire-rated assemblies shall be restored prior to re-occupancy by students.

2. Contractors shall consult school calendars published on district websites for calendar information for the current school year. School calendars for subsequent years can be assumed to be similar although specific dates will vary.
3. Contractor's draft schedule shall be amended after contract award to address changes in school schedules, coordination with construction packages being constructed by others, or other scheduling constraints deemed beneficial to the District. Schedule deviations which do not unreasonably deviate from these planning guidelines shall not be cause for claims for additional construction costs or project durations.

E. Related Requirements:

1. Document 00 11 16 "CSP 25-005KB FBISD Request for Competitive Sealed Proposals," and Document 00 21 16 "CSP Instructions to Bidders" for submission requirements for Contractor's Project Plan and Schedule to be included in Contractor's CSP response under "Section 4".
2. Documents 00 42 13.13, "Package A Base Bid Proposal Form BP017," and 00 42 13.16, "Package B "Alternate Bid Proposal Form BP017" for Contract Time.
3. Section 01 10 00 "Summary of Work BP017" for construction requirements.
4. Section 01 31 00 "Project Management and Coordination" for administration and coordination procedures.
5. Section 01 31 13 "Project Coordination" for project coordination requirements.
6. Section 01 32 16 "Construction Progress Schedule" for Contractor's construction schedule requirements.
7. Section 01 50 00 "Temporary Facilities and Controls" for Contractor supplied temporary facilities necessary for construction.
8. Section 01 52 14 "Temporary Facilities for Students" Contractor supplied temporary facilities to accommodate students during construction made necessary by the Contractor's intended means and methods of construction.

END OF DOCUMENT 00 31 13

Task Name	Days	Start	Finish	Feb-25	Mar-25	Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26
TRIPLEX CENTER RENOVATIONS	374	Tuesday, February 25, 2025	Friday, March 6, 2026														
Phase I - Mobilization	20	Tuesday, March 4, 2025	Monday, March 24, 2025														
NTP	1	Tuesday, March 4, 2025	Wednesday, March 5, 2025														
Insurance & Safety Plan Submission & Approvals	7	Tuesday, March 4, 2025	Tuesday, March 11, 2025														
Mobilization	7	Monday, March 17, 2025	Monday, March 24, 2025														
Phase II - Construction	347	Monday, March 24, 2025	Friday, March 6, 2026														



DOCUMENT 00 31 26 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for the Project. They provide Owner's information for Contractor's convenience and are intended to supplement rather than serve in lieu of Contractor's own investigations. They are made available for Contractor's convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing asbestos reports for Project, listed are appended to this Document.

1. Report: Asbestos Containing Materials Survey
Triplex Center Bond Package 017-Triplex Center renovations
550 Julie Rivers Drive
Sugar Land, Texas 77478
ECS Project No. 51:4363
Fort Bend Independent School District
September 20, 2024

END OF DOCUMENT 00 31 26

ASBESTOS CONTAINING MATERIALS SURVEY



TRIPLEX CENTER
BOND PACKAGE-017-TRIPLEX CENTER RENOVATIONS
550 JULIE RIVERS DRIVE
SUGAR LAND, TEXAS 77478

ECS PROJECT NO. 51:4363

FOR: FORT BEND INDEPENDENT SCHOOL DISTRICT

SEPTEMBER 20, 2024





September 20, 2024

Ms. Amanda Janek
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489
Amanda.Janek@fortbendisd.com

ECS Project No. 51:4363

Reference: Asbestos Containing Materials Survey, Triplex Center, 550 Julie Rivers Drive, Sugar Land, Texas 77478

Dear Ms. Janek:

ECS Southwest, LLP (ECS) is pleased to provide Fort Bend Independent School District with the results of the above referenced Asbestos Containing Materials Survey performed at Triplex Center located at 550 Julie Rivers Drive in Sugar Land, Texas 77478. This report summarizes our observations, analytical results, findings, and recommendations related to the work performed. The work described in this report was performed by ECS in general accordance with the Scope of Services described in ECS Proposal Number 51:6702 and the terms and conditions of the agreement authorizing those services.

ECS appreciates this opportunity to provide Fort Bend Independent School District with our services. If we can be of further assistance to you, please do not hesitate to contact us.

Sincerely,

ECS Southwest, LLP

Quinton Ayers
Environmental Scientist
qayers@ecslimited.com
202-993-2583

Martin Dehlinger
Department Manager, Associate Principal
mdehlinger@ecslimited.com
832-993-6476

EXECUTIVE SUMMARY

The subject property is developed with a mixed-use office building located at 550 Julie Rivers Drive, in Sugar Land, Fort Bend County, Texas 77478. At the time of our survey, the subject building was occupied and is currently scheduled to be renovated as part of Bond Package-017-Triplex Center Renovations.

On September 11, 2024, Mr. Quinton Ayers, an EPA accredited and Texas Department of State Health Services (TDSHS) licensed inspector license no. 604172, performed the asbestos containing material survey. Bulk samples were submitted to Southeast Environmental Microbiology Laboratories (SEEML) in Greenville, South Carolina for analysis via Polarized Light Microscopy (PLM) in accordance with the current EPA-600 methodology.

A total of 71 bulk samples from 13 homogeneous areas were submitted to the laboratory of which 123 layers were analyzed. Based on the laboratory analysis of the bulk samples collected during the survey, **NONE** of the materials was reported to contain asbestos above the regulatory limit of 1%.

Due to inaccessibility or the destructive means that asbestos sampling requires, unseen ACMs may remain within the building hidden behind inaccessible areas that include, but are not limited to, sub-grade walls, structural members, topping slabs, sub-grade sealants, flooring located below underlayments, areas behind exterior walls, pipe trenches, and subsurface utilities, etc.

If suspect materials are discovered during construction activities, they should be presumed to contain asbestos and be treated as ACMs or be sampled immediately upon discovery and prior to disturbance for asbestos content by an accredited or certified asbestos inspector in accordance with 29 Code of Federal Regulations (CFR) 1926.1101.

The executive summary is an integral portion of this report, however, ECS recommends the report be read in its entirety.

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Appendix III: Asbestos Bulk Sample Results

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1.0 SITE DESCRIPTION

The subject property consists of a vacant restaurant located at 550 Julie Rivers Drive, in Sugar Land, Fort Bend County, Texas 77478. At the time of our survey, the subject building was unoccupied and is currently scheduled to be renovated.

2.0 PURPOSE

The purpose of the Asbestos Containing Materials Survey was to identify asbestos-containing materials (ACMs) prior to renovation activities. The proposed scope of work is based on **Bond Package-017-Triplex Center Renovations** construction drawings dated March 13, 2024.

ECS Southwest is a Texas Department of State Health Services licensed Asbestos Consultant Agency No. 100592. Based on the Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and Texas Department of State Health Services (TDSHS) Texas Asbestos Health Protection Rules (TAHPR). A material is considered to be asbestos containing material (ACM) if one sample collected from the homogeneous area is found to contain one percent or greater of asbestos containing material. The identification of ACMs requires properly trained and licensed labor, regulated work practices, and special disposal.

3.0 METHODOLOGY

ECS performed the authorized Scope of Services in general accordance with our proposal, standard industry practice(s), and methods specified by regulation(s) for the identification of ACMs.

3.1 Asbestos-Containing Materials

Mr. Quinton Ayers (License No. 604172), a TDSHS licensed and U.S. Environmental Protection Agency (USEPA) accredited asbestos inspector, performed the asbestos containing materials surveys on September 11, 2024. Samples of suspect ACMs were collected utilizing hand tools and placed into individual, uniquely-labeled plastic bags. The scope of this survey was intended to generally meet the requirements of the Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1926.1101 Inspection Protocol.

Samples of suspect ACMs were collected utilizing hand tools and placed into individual, labeled plastic bags. Unique bulk suspect ACM samples were submitted to Southeast Environmental Microbiology Laboratories in Greenville, South Carolina for analysis via Polarized Light Microscopy (PLM) in accordance with the current EPA-600 methodology. Materials consisting of additional layers were analyzed separately. SEEML is listed as an accredited laboratory by the National Voluntary Laboratory Accreditation Plan (NVLAP) managed by the National Institute of Standards and Technology (NIST) and Texas Department of State Health Services (TDSHS) Laboratory license #300474 for bulk sample analysis by currently approved EPA methodology by PLM Method.

During the survey, ECS attempted to identify suspect ACMs in readily accessible areas. However, due to the destructive means required to identify some materials, certain areas were deemed inaccessible (i.e. behind walls or sub grade materials) and were not surveyed for suspect ACMs. Materials not in the immediate path of construction according to provided drawings dated March 13, 2024, were not sampled. Unidentified suspect ACMs may be located in these and/or other inaccessible areas.



Samples were collected in general accordance with EPA Standard 40 CFR 763 Subpart E, Asbestos Hazard Emergency Response Act (AHERA) and OSHA Standard 29 CFR 1926.1101 Inspection Protocol. Multiple samples of each unique material were submitted.

4.0 RESULTS

The following is a summary of laboratory results, findings and observations.

4.1 Asbestos Sampling

An ACM is defined as any material containing more than one percent (>1%) asbestos as determined using the method specified in Appendix E, Subpart E, 40 CFR Part 763, Section 1, PLM. Materials are categorized by the U.S. EPA in the following categories:

- Friable ACMs are defined as any ACM that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. Non-friable ACMs are defined as any ACM that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.
- Category I non-friable ACMs include packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than one percent (>1%) asbestos.
- Category II non-friable ACM are listed as any material, excluding Category I non-friable ACM, containing more than one percent (>1%) asbestos.

Regulated Asbestos Containing Materials (RACM) are friable ACM or non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading or has crumbled, been pulverized, or reduced to powder in the course of renovation and/or demolition operations.

In total, 71 bulk samples from 13 homogeneous areas were submitted to the laboratory, of which 123 layers were analyzed. Based on the laboratory analysis performed by Southeast Environmental Microbiology Laboratories of the bulk samples collected during the survey on September 11, 2024. **NONE** of the sampled materials were reported to contain 1% or greater asbestos content and therefore were **NOT** found to be asbestos containing. A detailed summary of the samples collected, locations, and results can be found in appendix III.

4.2 Suspect or Assumed Asbestos-Containing Materials

Due to the inaccessibility or the destructive means that asbestos sampling requires, additional suspect ACMs may remain within the building hidden behind inaccessible areas that include, but are not limited to, sub-grade walls, structural members, topping slabs, sub-grade sealants, flooring located below underlayments, areas behind exterior walls, pipe trenches, and subsurface utilities, etc. These areas were deemed inaccessible and were not assessed.

If these materials are discovered during construction activities, they should be presumed to contain asbestos and be treated as ACMs or be sampled immediately upon discovery and prior to disturbance for asbestos content by a certified asbestos inspector in accordance with 29 CFR 1926.1101.

Based upon our past experience in the identification of ACMs in similarly constructed buildings, the following additional suspect ACMs may also be located in inaccessible areas of the structure:

- Materials not in the immediate path of construction according to provided drawings dated March 13, 2024,
- Pipe Chases behind and above restrooms and sinks
- Crawlspace
- Underground utilities

5.0 RECOMMENDATIONS AND REGULATORY REQUIREMENTS

Based on our understanding of the purpose of the Asbestos Containing Materials Survey, the results of laboratory analysis, and our findings and observations, ECS presents the following recommendations.

5.1 Asbestos-Containing Materials

Based on the asbestos containing materials survey and laboratory results, None of the bulk samples submitted to Southeast Environmental Microbiology Laboratories were reported to contain detectable concentrations of asbestos. If additional suspect asbestos-containing materials are uncovered which were not accessible during this sampling event, it is recommended that these materials be sampled or tested immediately upon discovery for asbestos content by an asbestos inspector in accordance with 29 CFR 1926.1101.

Additional suspect ACMs may remain within inaccessible areas that include but are not limited to, sub-grade walls, structural members, topping slabs, exterior areas, sub-grade sealants, flooring located below underlayments, vapor barriers, pipe trenches, pipe chases and other subsurface utilities, etc. If additional suspect ACMs are uncovered which were not accessible during this survey, it is recommended that these materials either be assumed to contain asbestos or be sampled prior to disturbance upon discovery for asbestos content by an EPA accredited and TDSHS licensed asbestos inspector in accordance with 29 CFR 1926.1101 and Texas Asbestos Health Protection Rules (TAHPR).

6.0 LIMITATIONS

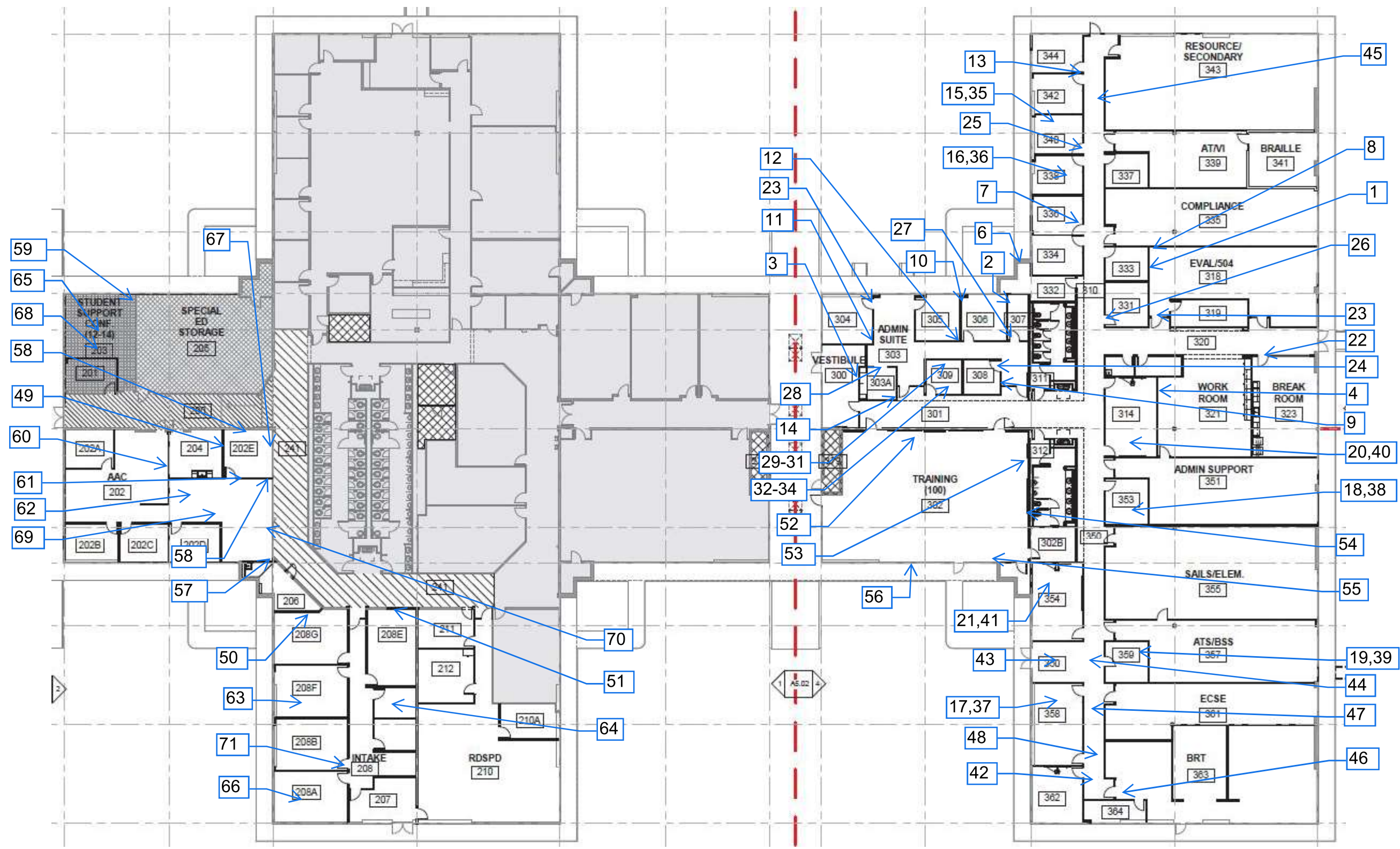
The conclusions and recommendations presented within this report are based upon a reasonable level of assessment within normal bounds and standards of professional practice for a site in this particular geographic setting. ECS is not responsible or liable for the discovery and elimination of hazards that may potentially cause damage, accidents, or injuries.

The observations, conclusions, and recommendations pertaining to environmental conditions at the subject site are necessarily limited to conditions observed, and/or materials reviewed at the time this study was undertaken. No warranty, expressed or implied, is made with regard to the conclusions and recommendations presented within this report. This report is provided for the exclusive use of the client. This report is not intended to be used or relied upon in connection with other projects or by other unidentified third parties without the written consent of ECS and the client.

During this study, samples were submitted for analysis at an accredited laboratory via polarized light microscopy. As with any similar survey of this nature, actual conditions exist only at the precise locations from which samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. No warranty, expressed or implied, is made.

Our recommendations are in part based on federal, state, and local regulations and guidelines. ECS does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies, any conditions at the site that may present a potential danger to public health, safety, or the environment. Under this scope of services, ECS assumes no responsibility regarding any response actions initiated as a result of these findings. General compliance with regulations and response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements.

Appendix I: Figures



Legend

- Non Asbestos Sample Locations

Note:
Locations are Approximate



PROJECT #:	51-4363
DRAWN BY:	QA
ASSIGN TO:	QA
PE:	MD
DATE:	September 20, 2024
REVISED:	----
SCALE:	Approximate
PRINTED:	9/20/2024

Fort Bend ISD Triplex Center
550 Julie Rivers Drive,
Sugar Land, Texas 77478

Sample Locations

Figure

1

Appendix II: Site Photographs



1 - Entrance



2 - Typical office space



3 - Typical storage room



4 - Typical hallway



5 - Typical ceiling tile samples



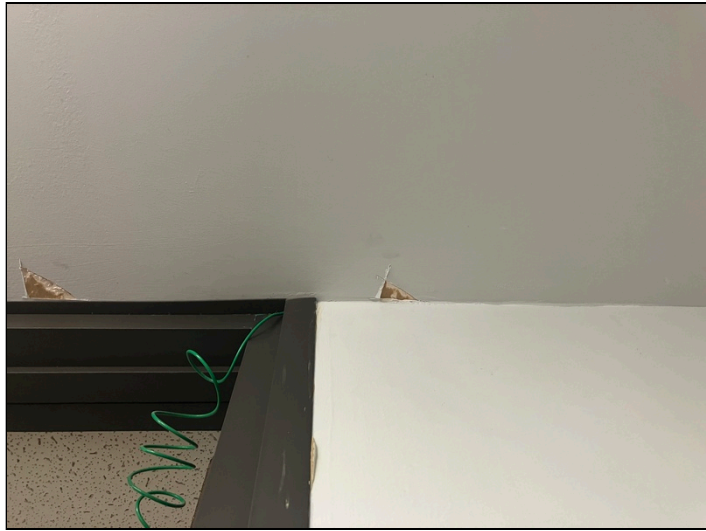
6 - Typical drywall wall sample



7 - Typical floor tile sample



8 - Typical dark gray cove base sample



9 - Typical drywall ceiling sample



10 - Typical floor masitc sample

Appendix III: Asbestos Bulk Sample Results



SEEML Asbestos Chain-of-Custody Form

102 Edinburgh Court, Greenville, SC. 29607

Ph: (864) 233-3770, Fax: (864) 233-6589

WWW.SEEML.COM

NVLAP Lab ID: 201031-0

Page ___ of ___

SEEML Ref#	<u>02-240916020</u>	Lab ID:	<u>147-217</u>
Company:	ECS Southwest LLP	Date Sample:	9/11/24
Project Manager:	Quinton	Project Name:	Fort Bend ISD Triplex Center
Address:	1000 N. Post Oak Rd. #240	Project Location:	550 Julie Rivers Drive
City, State, Zip:	Houston, Texas 77055		Sugar Land, Texas, 77478
Phone:	713-955-1980	Project No:	51-4363
Email:	QAyers@ecslimited.com		

PLM TAT: 3-DAY 2DAY 3 DAY 4 DAY 5 DAY

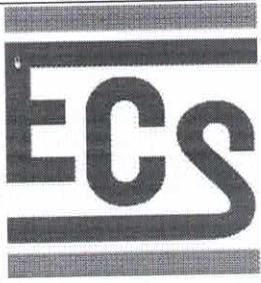
PLM-Bulk: Positive Stop YES — <input checked="" type="checkbox"/> PLM 600/R-93-116 (<1%) <input type="checkbox"/> PLM NOB (<1%) Gravimetric	PCM-AIR <input type="checkbox"/> NIOSH 7400
Point Count Positive Stop YES <input type="checkbox"/> 400 w/o Gravimetric (<0.25%) <input type="checkbox"/> 1000 w/o Gravimetric (0.1%) <input type="checkbox"/> 400 with Gravimetric (0.25%) <input type="checkbox"/> 1000 with Gravimetric (<0.1%)	SOIL/ROCK/VERMICULITE <input type="checkbox"/> PLM CARB 435- Level A (400 Point Count <0.25%) <input type="checkbox"/> PLM CARB 435- Level B (1000 Point Count <0.1%) <input type="checkbox"/> Cincinnati Method EPA 600/R-04/004 by PLM

TEM: SAME DAY NEXT DAY 2DAY 3DAY 4DAY 5DAY *TEM Analysis is subcontracted. TAT starts after PLM results have been submitted by SEEML, unless otherwise requested.

Sample ID	Description/Location	Analysis Type	Comments
See attached			

Relinquished by: Quinton Ayers	Digitally signed by Quinton Ayers Date: 2024.09.13 10:47:27 -05'00'	Time/Date 9/13/24	Received by: 	Time/Date 09-13-24
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Asbestos Inspection Form



Inspection Date:
9/11/24

Project No.:
51-4363

Project Name:
Fort Bend ISD Triplex Center

Building Address:
550 Julie Rivers Drive, Sugar Land, Texas 77478

Inspector Name:
Quinton Ayers

Lab & TAT:
3-day

Building Description Notes & Exclusions:

Sample Number	Location & Material	Condition	Quantity
1	Dark gray cove base with tan mastic	Good	7,500 SF
2	Dark gray cove base with tan mastic	Good	7,500 SF
3	Dark gray cove base with tan mastic	Good	7,500 SF
4	Dark gray cove base with tan mastic	Good	7,500 SF
5	Dark gray cove base with tan mastic	Good	7,500 SF
6	Dark gray cove base with tan mastic	Good	7,500 SF
7	Dark gray cove base with tan mastic	Good	7,500 SF
8	Drywall wall with joint compound	Good	12,000 SF
9	Drywall wall with joint compound	Good	12,000 SF
10	Drywall wall with joint compound	Good	12,000 SF
11	Drywall wall with joint compound	Good	12,000 SF
12	Drywall wall with joint compound	Good	12,000 SF
13	Drywall wall with joint compound	Good	12,000 SF
14	Drywall wall with joint compound	Good	12,000 SF
15	4x2 white ceiling tile with small pocks	Good	8,000 SF
16	4x2 white ceiling tile with small pocks	Good	8,000 SF
17	4x2 white ceiling tile with small pocks	Good	8,000 SF
18	4x2 white ceiling tile with small pocks	Good	8,000 SF

Sample Number	Location & Material	Condition	Quantity
19	4x2 white ceiling tile with small pocks	Good	8,000 SF
20	4x2 white ceiling tile with small pocks	Good	8,000 SF
21	4x2 white ceiling tile with small pocks	Good	8,000 SF
22	Yellow carpet mastic	Good	5,500 SF
23	Yellow carpet mastic	Good	5,500 SF
24	Yellow carpet mastic	Good	5,500 SF
25	Yellow carpet mastic	Good	5,500 SF
26	Yellow carpet mastic	Good	5,500 SF
27	Yellow carpet mastic	Good	5,500 SF
28	Yellow carpet mastic	Good	5,500 SF
29	Drywall ceiling with joint compound	Good	40 SF
30	Drywall ceiling with joint compound	Good	40 SF
31	Drywall ceiling with joint compound	Good	40 SF
32	1x1 floor tile with yellow mastic	Good	500 SF
33	1x1 floor tile with yellow mastic	Good	500 SF
34	1x1 floor tile with yellow mastic	Good	500 SF
35	Yellow insulation	Good	6,000 SF
36	Yellow insulation	Good	6,000 SF
37	Yellow insulation	Good	6,000 SF
38	Yellow insulation	Good	6,000 SF
39	Yellow insulation	Good	6,000 SF
40	Yellow insulation	Good	6,000 SF
41	Yellow insulation	Good	6,000 SF
42	Gray vinyl flooring	Good	5,000 SF
43	Gray vinyl flooring	Good	5,000 SF
44	Gray vinyl flooring	Good	5,000 SF
45	Gray vinyl flooring	Good	5,000 SF
46	Gray vinyl flooring	Good	5,000 SF
47	Gray vinyl flooring	Good	5,000 SF
48	Gray vinyl flooring	Good	5,000 SF
49	Black cove base with tan mastic	Good	850 SF

Sample Number	Location & Material	Condition	Quantity
50	Black cove base with tan mastic	Good	850 SF
51	Black cove base with tan mastic	Good	850 SF
52	Gray cove base	Good	1,200 SF
53	Gray cove base	Good	1,200 SF
54	Gray cove base	Good	1,200 SF
55	Gray cove base	Good	1,200 SF
56	Gray cove base	Good	1,200 SF
57	Drywall wall with joint compound	Good	4,500 SF
58	Drywall wall with joint compound	Good	4,500 SF
59	Drywall wall with joint compound	Good	4,500 SF
60	Drywall wall with joint compound	Good	4,500 SF
61	Drywall wall with joint compound	Good	4,500 SF
62	4x2 white ceiling tiles with small pocks	Good	2,000 SF
63	4x2 white ceiling tiles with small pocks	Good	2,000 SF
64	4x2 white ceiling tiles with small pocks	Good	2,000 SF
65	4x2 white ceiling tiles with small pocks	Good	2,000 SF
66	4x2 white ceiling tiles with small pocks	Good	2,000 SF
67	Floor tile with tan mastic	Good	2,000 SF
68	Floor tile with tan mastic	Good	2,000 SF
69	Floor tile with tan mastic	Good	2,000 SF
70	Floor tile with tan mastic	Good	2,000 SF
71	Floor tile with tan mastic	Good	2,000 SF



Southeast Environmental Microbiology Laboratories

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Greenville, SC 29607
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Fax: (864) 233-6589

Asbestos Analytical Report By: Polarized Light Microscopy

This report has been prepared for **ECS Southwest** the information and data has been checked for thoroughness and accuracy. The results reported apply only to the materials as received. The documents(s) contained herein are confidential and privileged information intended for the exclusive use of the individual or entity named above. This report shall not be reproduced except in full without SEEML's approval.

Client Project Name: Fort Bend ISD Triplex Center

The Following report was prepared using this test method(s) contained within this document.

- PLM Bulk Asbestos Fiber Analysis:EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples
- PLM 400 Point Count (<0.25%) EPA 600/R-93/116
- PLM 1000 Point Count (<0.1%) EPA 600/R-93/116
- PLM Carb 435 Level A Reporting Limit (<0.25%)
- PLM Carb 435 Level B (Reporting limit <0.1%)
- PLM by EPA/600/R-93/116 with Milling Prep 400 Point Count
- PLM Vermiculite Initial Screening EPA 600R-93/116
- PLM Cincinnati Method 600/R-04/004 (Amphibole Only)
- PLM Vermiculite Method SOF-V 198.8 (Step 1 Chrysotile & Prep)
- PLM Vermiculite Method SOF-V 198.8 (Step 2 (Amphibole))

Approved By : *Derrick Young*

Thank you for choosing SEEML Labs. We strive to provide superior quality testing, analytical data and customer service. SEEML is accredited through the National Institute of Standards and Technology (NIST) National Voluntary Accreditation Program (NVLAP) for bulk asbestos analysis NVLAP # 201031-0 and licensed by the Texas Department of State Health Services (License Number: 300474). This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the US government.



Southeast Environmental Microbiology Laboratories - Asbestos Division

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 NVLAP Lab ID:201031-0 Texas Lic: 300474

PLM Asbestos Bulk Sample Summary

Client:		ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml	Date Sampled:	09/13/2024
			Date Received:	09/13/2024
			Date Analyzed:	09/18/2024
			Date Reported:	09/18/2024
			Date Revised:	
			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
147A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
1				
147B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
1				
148A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
2				
148B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
2				
149A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
3				
149B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
3				
150A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
4				
150B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
4				
151A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
5				

Approved By: Derrick Young

Disclaimer:

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NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. NAD means no asbestos fibers were detected. When detected the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

Guidelines for Interpretation:

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 NVLAP Lab ID:201031-0 Texas Lic: 300474

PLM Asbestos Bulk Sample Summary

Client:		ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml	Date Sampled:	09/13/2024
			Date Received:	09/13/2024
			Date Analyzed:	09/18/2024
			Date Reported:	09/18/2024
			Date Revised:	
			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
151B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
5				
152A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
6				
152B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
6				
153A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Dark gray cove base with tan mastic
7				
153B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Dark gray cove base with tan mastic
7				
154A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
8				
154B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
8				
154C	None Detected	25% Cellulose	75% Gypsum	(White) Drywall/Drywall Wall with joint compound
8				
155A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
9				

Approved By: Derrick Young

Disclaimer:

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NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

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 NVLAP Lab ID:201031-0 Texas Lic: 300474

PLM Asbestos Bulk Sample Summary

Client: ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml.com		Date Sampled:	09/13/2024	
		Date Received:	09/13/2024	
		Date Analyzed:	09/18/2024	
		Date Reported:	09/18/2024	
		Date Revised:		
		Project Name:	Fort Bend ISD Triplex Center	
		Project No:	51-4363	
Analyzed by:	Jessica Orchet	Project Address:	550 Julie Rivers Drive	
		City, State, ZIP:	Sugar Land , Texas, 77478	
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#:	G-240916020	
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
155B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
9				
155C	None Detected	20% Cellulose	80% Gypsum	(White) Drywall/Drywall Wall with joint compound
9				
156A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
10				
156B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
10				
156C	None Detected	25% Cellulose	75% Gypsum	(White) Drywall/Drywall Wall with joint compound
10				
157A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
11				
157B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
11				
157C	None Detected	15% Cellulose, 3% Fiberglass	82% Gypsum	(Off-White) Drywall/Drywall Wall with joint compound
11				
158A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
12				

Approved By: Derrick Young

Disclaimer:

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NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. NAD means no asbestos fibers were detected. When detected the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

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PLM Asbestos Bulk Sample Summary

Client: ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml.com		Date Sampled: 09/13/2024		
		Date Received: 09/13/2024		
		Date Analyzed: 09/18/2024		
		Date Reported: 09/18/2024		
		Date Revised:		
		Project Name: Fort Bend ISD Triplex Center		
		Project No: 51-4363		
Analyzed by: Jessica Orchet	Project Address: 550 Julie Rivers Drive			
	City, State, ZIP: Sugar Land, Texas, 77478			
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#: G-240916020		
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
158B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
12				
158C	None Detected	15% Cellulose, 3% Fiberglass	82% Gypsum	(White) Drywall/Drywall Wall with joint compound
12				
159A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall Wall with joint compound
13				
159B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall Wall with joint compound
13				
159C	None Detected	20% Cellulose	80% Gypsum	(White) Drywall/Drywall Wall with joint compound
13				
160A	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound 1/Drywall Wall with joint compound
14				
160B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound 2/Drywall Wall with joint compound
14				
160C	None Detected	30% Cellulose	70% Gypsum	(White) Drywall/Drywall Wall with joint compound
14				
161A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
15				

Approved By: Derrick Young

Disclaimer:

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NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

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PLM Asbestos Bulk Sample Summary

Client: ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml.com		Date Sampled: 09/13/2024		
		Date Received: 09/13/2024		
		Date Analyzed: 09/18/2024		
		Date Reported: 09/18/2024		
		Date Revised:		
		Project Name: Fort Bend ISD Triplex Center		
		Project No: 51-4363		
Analyzed by: Jessica Orchet	Project Address: 550 Julie Rivers Drive			
	City, State, ZIP: Sugar Land , Texas, 77478			
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#: G-240916020		
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
162A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
16				
163A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
17				
164A	None Detected	15% Min Wool, 65% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
18				
165A	None Detected	15% Min Wool, 65% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
19				
166A	None Detected	15% Min Wool, 65% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
20				
167A	None Detected	15% Min Wool, 65% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tile with small pocks
21				
168A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
22				
169A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
23				
170A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
24				

Approved By: Derrick Young

Disclaimer:

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NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

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PLM Asbestos Bulk Sample Summary

Client:		ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml	Date Sampled:	09/13/2024
			Date Received:	09/13/2024
			Date Analyzed:	09/18/2024
			Date Reported:	09/18/2024
			Date Revised:	
			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
171A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
25				
172A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
26				
173A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
27				
174A	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/Yellow Carpet mastic
28				
175A	None Detected	3% Fiberglass, 30% Cellulose	67% Gypsum	(White) Drywall/Drywall ceiling with joint compound
29				
176A	None Detected	3% Fiberglass, 35% Cellulose	62% Gypsum	(White) Drywall/Drywall ceiling with joint compound
30				
177A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall ceiling with joint compound
31				
177B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall ceiling with joint compound
31				
177C	None Detected	40% Cellulose	60% Gypsum	(White) Drywall/Drywall ceiling with joint compound
31				

Approved By: Derrick Young

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Southeast Environmental Microbiology Laboratories - Asbestos Division

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 Phone: 864-233-3770, Fax: 864-233-6589 , www.seeml.com
 NVLAP Lab ID:201031-0 Texas Lic: 300474

PLM Asbestos Bulk Sample Summary

Client:		ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml.com	Date Sampled:	09/13/2024	
			Date Received:	09/13/2024	
			Date Analyzed:	09/18/2024	
			Date Reported:	09/18/2024	
			Date Revised:		
			Project Name:	Fort Bend ISD Triplex Center	
			Project No:	51-4363	
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive	
			City, State, ZIP:	Sugar Land , Texas, 77478	
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020	
Lab No.:	Client No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
178A	32	None Detected	None Detected	100% Organic Matrix	(Off-White) Floor Tile/1 x 1 Flor Tile with yellow mastic
178B	32	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/1 x 1 Flor Tile with yellow mastic
179A	33	None Detected	None Detected	100% Organic Matrix	(Off-White) Floor Tile/1 x 1 Flor Tile with yellow mastic
179B	33	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/1 x 1 Flor Tile with yellow mastic
180A	34	None Detected	None Detected	100% Organic Matrix	(Off-White) Floor Tile/1 x 1 Flor Tile with yellow mastic
180B	34	None Detected	None Detected	100% Organic Matrix	(Yellow) Mastic/1 x 1 Flor Tile with yellow mastic
181A	35	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
182A	36	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
183A	37	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation

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PLM Asbestos Bulk Sample Summary

Client:		ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml	Date Sampled:	09/13/2024
			Date Received:	09/13/2024
			Date Analyzed:	09/18/2024
			Date Reported:	09/18/2024
			Date Revised:	
			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
184A	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
38				
185A	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
39				
186A	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
40				
187A	None Detected	10% Fiberglass, 90% Min Wool	None Detected	(Yellow) Insulation/Yellow Insulation
41				
188A	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring
42				
188B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring
42				
189A	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring
43				
189B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring
43				
190A	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring
44				

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PLM Asbestos Bulk Sample Summary

Client: ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml.com		Date Sampled: 09/13/2024	Date Received: 09/13/2024	Date Analyzed: 09/18/2024	Date Reported: 09/18/2024	Date Revised:	Project Name: Fort Bend ISD Triplex Center	Project No: 51-4363
Analyzed by: Jessica Orchet	Project Address: 550 Julie Rivers Drive		City, State, ZIP: Sugar Land, Texas, 77478					
Methodology: EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#: G-240916020							
Lab No.:	Client No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location			
190B	44	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring			
191A	45	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring			
191B	45	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring			
192A	46	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring			
192B	46	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring			
193A	47	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring			
193B	47	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring			
194A	48	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Gray vinyl flooring			
194B	48	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Gray vinyl flooring			

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			Date Received:	09/13/2024
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			Date Reported:	09/18/2024
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			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
195A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Black cove base with tan mastic
49				
195B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Black cove base with tan mastic
49				
196A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Black cove base with tan mastic
50				
196B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Black cove base with tan mastic
50				
197A	None Detected	None Detected	100% Organic Matrix	(Black) Cove Base/Black cove base with tan mastic
51				
197B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Black cove base with tan mastic
51				
198A	None Detected	None Detected	100% Organic Matrix	(Gray) Cove Base/Gray cove base
52				
198B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Gray cove base
52				
199A	None Detected	None Detected	100% Organic Matrix	(Gray) Cove Base/Gray cove base
53				

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			Date Revised:	
			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
			City, State, ZIP:	Sugar Land , Texas, 77478
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
199B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Gray cove base
53				
200A	None Detected	None Detected	100% Organic Matrix	(Gray) Cove Base/Gray cove base
54				
200B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Gray cove base
54				
201A	None Detected	None Detected	100% Organic Matrix	(Gray) Cove Base/Gray cove base
55				
201B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Gray cove base
55				
202A	None Detected	None Detected	100% Organic Matrix	(Gray) Cove Base/Gray cove base
56				
202B	None Detected	None Detected	100% Organic Matrix	(Off-White) Mastic/Gray cove base
56				
203A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall wall with joint compound
57				
203B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall wall with joint compound
57				

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		Project Name: Fort Bend ISD Triplex Center		
		Project No: 51-4363		
Analyzed by: Jessica Orchet	Project Address: 550 Julie Rivers Drive			
	City, State, ZIP: Sugar Land, Texas, 77478			
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#: G-240916020		
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
203C	None Detected	20% Cellulose	80% Gypsum	(White) Drywall/Drywall wall with joint compound
57				
204A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall wall with joint compound
58				
204B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall wall with joint compound
58				
204C	None Detected	30% Cellulose	70% Gypsum	(White) Drywall/Drywall wall with joint compound
58				
205A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall wall with joint compound
59				
205B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall wall with joint compound
59				
205C	None Detected	25% Cellulose, 3% Fiberglass	72% Gypsum	(Off-White) Drywall/Drywall wall with joint compound
59				
206A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall wall with joint compound
60				
206B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall wall with joint compound
60				

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			Project Name:	Fort Bend ISD Triplex Center
			Project No:	51-4363
Analyzed by:	Jessica Orchet		Project Address:	550 Julie Rivers Drive
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Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.		SEEML Ref#:	G-240916020
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
206C	None Detected	40% Cellulose	60% Gypsum	(Off-White) Drywall/Drywall wall with joint compound
60				
207A	None Detected	None Detected	100% Binder/Filler	(White) Texture/Drywall wall with joint compound
61				
207B	None Detected	None Detected	100% Binder/Filler	(White) Joint Compound/Drywall wall with joint compound
61				
207C	None Detected	30% Cellulose	70% Gypsum	(White) Drywall/Drywall wall with joint compound
61				
208A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tiles with small pocks
62				
209A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tiles with small pocks
63				
210A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tiles with small pocks
64				
211A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tiles with small pocks
65				
212A	None Detected	10% Fiberglass, 70% Cellulose	20% Perlite	(Gray) Ceiling Tile/4 x 2 white ceiling tiles with small pocks
66				

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Methodology: EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.								
Lab No.:	Client No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location			
213A	67	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Floor tile with tan mastic			
213B	67	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Floor tile with tan mastic			
214A	68	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Floor tile with tan mastic			
214B	68	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Floor tile with tan mastic			
215A	69	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Floor tile with tan mastic			
215B	69	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Floor tile with tan mastic			
216A	70	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Floor tile with tan mastic			
216B	70	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Floor tile with tan mastic			
217A	71	None Detected	None Detected	100% Organic Matrix	(Gray) Vinyl Flooring/Floor tile with tan mastic			

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Southeast Environmental Microbiology Laboratories - Asbestos Division



102 Edinburgh Court Greenville, SC 29607
 Phone: 864-233-3770, Fax: 864-233-6589 , www.seeml.com
 NVLAP Lab ID:201031-0 Texas Lic: 300474

PLM Asbestos Bulk Sample Summary

Client: ECS Southwest 100 Post Oak Road #240 Houston, TX, 77055)814-2502/mdehlinger@ecslimited.com, mak@seeml	Date Sampled:	09/13/2024		
	Date Received:	09/13/2024		
	Date Analyzed:	09/18/2024		
	Date Reported:	09/18/2024		
	Date Revised:			
	Project Name:	Fort Bend ISD Triplex Center		
	Project No:	51-4363		
Analyzed by:	Jessica Orchet	Project Address: 550 Julie Rivers Drive		
		City, State, ZIP: Sugar Land , Texas, 77478		
Methodology:	EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples.	SEEML Ref#: G-240916020		
Lab No.:	% Asbestos Type	% Fibrous Non-Asbestos Material Type	% Non-Fibrous Material	Description/Location
Client No.:				
217B	None Detected	None Detected	100% Organic Matrix	(Tan) Mastic/Floor tile with tan mastic
71				

Approved By: Derrick Young

Disclaimer:
 The results in this report only apply to the samples as received.
 NOB samples are tested as a preliminary analysis. We highly recommend for Negative NOB samples resulting in less than 1% Asbestos to be verified by TEM or Point Analysis.

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. NAD means no asbestos fibers were detected. When detected the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

Guidelines for Interpretation:
 Any opinions/interpretations expressed in this report are outside the scope of this laboratory's accreditation. Interpretation of the data and information within this document is left to the company, consultant, and/or persons who conducted the fieldwork. A material is considered regulated asbestos containing material (ACM) where the asbestos content is determined to be one percent or greater. Several organizations, including the American Conference of Government Industrial Hygienists (ACGIH); the American Industrial Hygiene Association (AIHA); the Indoor Air Quality Association (IAQA); the United States Environmental Protection Agency (USEPA); the Centers for Disease Control (CDC) as well as the California Department of Health Services (CADHS) have published guidelines for assessment and interpretation of analytical data indicating a tested material is ACM.

Appendix IV: Certifications/ Licenses



Texas Department of State Health Services

ECS SOUTHWEST, LLP

is certified to perform as an

Asbestos Consultant Agency

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1954 and Title 12, Texas Administrative Code, Chapter 295 relating to Texas Asbestos Health Protection, as long as this license is not suspended or revoked.



License Number: 100592

Expiration Date: 07/05/2026

Control Number: 97672

Jennifer Shuford, MD
Jennifer Shuford, MD, MPH,
Commissioner of Health

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

SEE BACK



Texas Department of State Health Services

SOUTHEAST ENVIRONMENTAL MICROBIOLOGY LABORATORIES
DBA
SEEML

is certified to perform as an

Asbestos Laboratory
PLM

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1954 and Title 12, Texas Administrative Code, Chapter 295 relating to Texas Asbestos Health Protection, as long as this license is not suspended or revoked.



License Number: 300474

Expiration Date: 03/13/2025

Control Number: 96700

*Jennifer Shuford, MD, MPH,
Commissioner of Health*

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

SEE BACK



**Texas Department of
State Health Services**

Asbestos Inspector

QUINTON DAVIS AYERS

License No. 604172

Control No. 100868

Expiration Date: 14-Apr-2026





**Texas Department of
State Health Services**

Asbestos Individual Consultant

MARTIN J DEHLINGER

License No. 105786

Control No. 98170

Expiration Date: 15-Feb-2025





DOCUMENT 00 41 13 - 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:

DOCUMENT 00 42 13.11 - 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



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

CSP No: 25-005KB BP 017 - BP Name: Triplex Renovations

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 cre8 Architects dated 10/2/2024 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: Renovation Work including selective demolition and interior alterations of the existing Triplex Center Building 2 & 3.

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 393 calendar days to complete. Contractor agrees the work will be substantially completed within 393 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 017 _____

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. [\\$Click or tap here to enter text.](#) NA
- B. [\\$Click or tap here to enter text.](#) NA

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 – SITE CONCRETE

- A. Provide unit pricing for the following site concrete work:
 - 01 Add/Delete 60” Wide Sidewalks _____ Lin. Foot (LF)
 - 02 Add/Delete Non-Traffic Concrete Flatwork _____ Sq. Foot (SF)
 - 03 Add/Delete Med. Duty (5”) Concrete Paving _____ Sq. Foot (SF)
 - 04 Add/Delete Heavy Duty (7”) Concrete Paving _____ Sq. Foot (SF)
 - 05 Add/Delete 6” Concrete Curb _____ Lin. Foot (LF)

UNIT PRICES – ELECTRICAL POWER

- A. Provide unit pricing for the following electrical work:
 - 01 Add/Delete 120V Duplex Rec. On Nearby Circuit _____ Each (EA)
 - 02 Add/Delete 120V Duplex Rec. On Dedicated Circuit, including 20 amp circuit breaker _____ Each (EA)
 - 03 Add/Delete 220V Rec. On Dedicated Circuit including 20 amp circuit breaker _____ Each (EA)
 - 04 Add/Delete Two-Way Light Switch _____ Each (EA)
 - 05 Add/Delete Two-Way Light Switch _____ Each (EA)
 - 06 Add/Delete J-Box with 1-1/4” Conduit stubbed to above ceiling _____ Each (EA)

UNIT PRICES – DATA

- A. Provide unit pricing for the following electrical work:
 - 01 Add/Delete Data Port Wired to Nearest IDF/MDF _____ Each (EA)

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: 25-005KB **BP 017 BP Name:** Triplex Center Renovations

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 cre8 Architects dated 10/2/2024 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: Renovation Work including selective demolition and interior alterations of the existing Triplex Center.

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 393 calendar days to complete. Contractor agrees the work will be substantially completed within 393 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 017 _____ Base Proposal

BP 017 _____ Alternates
 BP 017 _____ 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. \$ Add dollar amount . Add description of allowance
- B. \$ Add dollar amount . Add description of allowance

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:

VI. UNIT PRICES – ALTERNATE BID

UNIT PRICES – NA

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)

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

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.

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

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)

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

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

006000.01 – PROJECT
FORMS Page 7 of 20

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

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



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. Kristen Davison Malone

Ms. Judy Dae, President

Dr. Shirley Rose Gilliam, Vice President

Ms. Angie Hanan

Ms. Sonya Jones

Mr. Rick Garcia

Mr. David Hamilton, Secretary

Dr. Marc Smith, Superintendent

Current Local Government Officers includes:

Steven Basset, Deputy Superintendent

Beth Martinez, Deputy Superintendent

Robert Scamardo, General Counsel

Glenda Johnson, Chief Human Resources Officer

David Rider, Chief of Police

Kwabena Mensah, Chief of Schools

Damian Viltz, Chief Operations Officer

Rhonda mason , Asst Superintendent Elem

Jerry Lemley, Asst Superintendent Sec

Antignolo Matthew, Exec Dir Child Nutrition

Pandit Payal, Exec Dir Collab Communities

Fuzetti Carolina, Exec Dir Design & Construction

Nunez Wendy, Exec Dir Elementary Schools

Mason Rhonda, Exec Dir Elementary Schools

Ford Ida, Exec Dir Elementary Schools

Kimberly Lawson, 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

Patin Mitzi, Exec Dir Info Systems

Jacob Jojo, Exec Dir Info Tech Service

Wilbanks Coby, General Counsel

Williams Stephanie, Exec Dir Org Development

Causey Ashley, Exec Dir Secondary Schools

Lyons-Lewis, Deidra Exec Dir Secondary Schools

Westbrook Pilar, Exec Dir Sel & Comp.Health

Smith-Watson Sonya, Exec Dir Student Affairs

Hill Deena, Exec Dir Student Supp Svc

Hubbard Melissa, Exec Dir Teach & Learning

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

For vendor doing business with local governmental entity

FORM CIQ

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

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

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

006000.01–PROJECT
FORMS Page 14 of 20

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

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

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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

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

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.

RETURN THIS DOCUMENT IN FRONT OF ORIGINAL SUBMISSION PACKAGE

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: _____

DOCUMENT 00 62 16 - FORT BEND ISD CONSTRUCTION BOND AND INSURANCE REQUIREMENTS

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.

<p>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.)</p>	<p>Contract Limit or Replacement Cost Value of Scope of Work whichever is greater</p> <p>Permission to Occupy granted</p> <p>Deductible: 1% of contract, \$50,000 maximum, unless otherwise approved by the Owner.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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 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.

Init.

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User Notes:

(1397578103)

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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.)

Init.

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

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.

§ 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.

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

PAGE 2

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

PAGE 3

[] 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

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§ 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.

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[] 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)



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.

<p>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.)</p>	<p>Contract Limit or Replacement Cost Value of Scope of Work whichever is greater</p> <p>Permission to Occupy granted</p> <p>Deductible: 1% of contract, \$50,000 maximum, unless otherwise approved by the Owner.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

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:

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

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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User Notes:

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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.)

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User Notes:

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

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.)

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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.

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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.

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§ 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.)

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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.)

§ 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.

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User Notes:

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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

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§ 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.

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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 rely 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

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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

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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

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§ 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
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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.)

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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,

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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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[] 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
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[] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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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)

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

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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.

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§ 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.

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

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

PAGE 3

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

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§ 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%)

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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.)~~

§ 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.
- .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.

§ 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,

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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.

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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.

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[] Litigation in a court of competent jurisdiction

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

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- .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

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Dr. Christie Whitbeck, Superintendent
Fort Bend Independent School District

§ 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

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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,

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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)

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

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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

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§ 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

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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.

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§ 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 of 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

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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

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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;

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6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
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

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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 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.

§ 9.8.3 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

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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, 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 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

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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

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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.

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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.

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§ 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.

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§ 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.

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§ 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)

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§ 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.

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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.

Additions and Deletions Report for AIA® Document A201® – 2017

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(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

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.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~~ § 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

- .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

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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 of 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.

...

§ 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.

...

§ 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- 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-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.

...

§ 3.9.1 The Contractor shall employ a competent ~~superintendent~~-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.

...

§ 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.

...

§ 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.

...

§ 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 or 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 or 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

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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, 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. 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.

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§ 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

...

§ 8.3.1 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 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~~ 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. 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.

...

§ 9.8.6 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 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, 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 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 of 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.

§ 11.4.1 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.

§ 11.4.2 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.

§ 11.4.3 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:

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- 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.

§ 11.3.2 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

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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, Closcout 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 noneonforming 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 ~~24~~ninety (90) days after occurrence of the event giving rise to such Claim or within ~~24~~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

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User Notes:

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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)

DIVISION 1 – GENERAL REQUIREMENTS

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. Sequence of Construction
4. Phased construction
5. Access to site
6. Coordination with occupants
7. 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 Division 00 FBISD Procurement Forms

1.4 SCOPE OF WORK. The Work consists of:

- A. Renovation of Triplex Center to include selective demolition and interior alterations.

1. Project Location: 550 Julie Rivers Drive, Sugar Land, Texas 77478
2. Owner: Fort Bend ISD, 16431 Lexington Blvd., Sugar Land, Texas 77479.
3. Architect: cre8Architects, 3815 Montrose Blvd, Suite123 Houston, Texas 77006; telephone 713.526.2738.

- 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 10 00 Summary of Work

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- 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. Temporary classroom space (Swing Space) if needed, shall be provided by the Contractor or coordinated at the campus. When Contractor is to provide temporary classroom(s), they will be responsible for all associated planning, permitting, scheduling, installation, removal, site restoration, coordination and costs associated with providing temporary space for classrooms. Temporary classroom space will be in accordance with Section 00 52 14 - TEMPORARY FACILITIES FOR STUDENTS. The Contractor may submit, as part of the proposal, optional phasing plans that can potentially save the District time and money.
 - B. 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.
 - C. Refer to the School Operations Parameter Statement Section for details of the regular working hours, holidays and procedures for custodial overtime, etc.
 - D. Work cannot start in a particular Phase until students/staff have been relocated to the designated Swing Space (either in the existing building or in Temporary Buildings outside) or until there is an arrangement in place.
 - 1. Close coordination with the A/E, Program Manager, and the School Staff, will be required of the Contractor.
 - E. Some rooms within a Phase may be emptied of furniture, boxes, etc., while others may not be. This is dependent upon where the actual Swing Space will be located or any other arrangements required in the phasing plan. Protection of contents and contents moved by the contractor are the responsibility of the Contractor until work is completed.
 - F. 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.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 10 00 Summary of Work

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- G. Refer to Construction Documents for additional Phasing information.
- 1.9 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.
- 1.10 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.
- 1.11 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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 10 00 Summary of Work

-
- Submittals
 - Transmittals
 - Field Details
 - Field Work Directives
 - Punch List
 - Safety Notices

1.12 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.

1.13 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.

1.14 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.

1.15 Construction Specification Index: All construction documentation will follow the 2016 Construction Specification Index format.

1.16 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 SEQUENCE OF CONSTRUCTION

- A. Construct the Work in Building 2 in work sequences as follows:
 1. Work Sequence 1: Commence and complete Work in AAC area prior to commencing Work in INTAKE and RDSPD areas.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 10 00 Summary of Work

2. Work Sequence 2: Upon completion of Work in AAC area, commence Work in INTAKE and RDSPD areas.
3. Work in the remaining areas of Building 2 shall be performed concurrently with Work Sequences 1 and 2.

3.2 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 10 00 Summary of Work

-
- J. Contractor shall not use or allow anyone other than Owner employees to use facility equipment, except in an emergency.

End of Section 01 10 00

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 14 13 Certification of Compliance / Contractor Identification

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

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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 23 00 Alternates

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by Proposers and stated on the Proposal Form for certain work defined in the Proposal Requirements that may be added to or deducted from the base bid amount if 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 in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the total addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum. Pricing for alternates may not be submitted or listed in the form of an allowance amount on the proposal form.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
 - 2. Cost listed for each Alternate includes cost of related coordination, modification or adjustment.
- B. Notification: Immediately following award of the Contract, Contractor shall prepare and distribute to each entity or person to be involved in the performance of the Alternate Work, a notification of the status of each Alternate scheduled herein. Indicate which alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates if any.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Contractor shall be responsible for any changes in the Work affected by acceptance of Alternates. Claims for additional costs or time extensions resulting from changes to the Work as a result of the Owner's election of any or all Alternates will only be considered if it is a deferred for later consideration.
- E. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 PRODUCTS (Not Used)

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 23 00 Alternates

PART 3 EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Refer to section 00 Competitive Sealed Proposal forms for Schedule of Alternates

End of Section 01 23 00

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

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

-
- 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**

_____ Date

_____ Date

_____ 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 26 00 CONTRACT MODIFICATION PROCEDURES

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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 26 00 CONTRACT MODIFICATION PROCEDURES

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

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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 29 00 Payment Procedures

- 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

-
- 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

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 PM 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.

DIVISION 1 – GENERAL REQUIREMENTS
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,

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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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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

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

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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.

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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
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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

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Name of Project</p> <p>2. Project Number – (If applicable)</p> <p>3. Application Number – from AIA document G702</p> <p>4. Application Date is same date as on draw application</p> <p>5. Reporting Period – from AIA document G702 “From: To:”</p> <p>6. SBE Goal as set by the prime contractor for this project as applicable</p> <p>7. Scheduled Completion date for your project per the approved contract or approved change order</p> <p>8. – 10. Business name of prime contractor – phone & fax</p> <p>11. Prime contractor mailing address</p> <p>12.-14. Project Manager’s name - phone & fax</p> <p>15. Amount of contract including original contract amount, change orders and approved alternatives</p> <p>16. The total of this draw or invoice as authorized on the AIA document G702</p> <p>17. Percentage of project completed to this date by SBE Sub-contractor/Sub-consultant (Total SBE from Box 26 divided by Box 15)</p> <p>18. The total amount invoiced on this project to date</p> <p>19. Total percentage of project completed to date</p> <p>20. Federal Identification Number</p> | <p>21. Business name of Sub-contractor / Sub-consultant</p> <p>22. Sub-contractor’s / sub-consultant’s SBE Certification Designation as applicable (SBE=Small Business Enterprise; N=Non-Small Business Enterprise)</p> <p>23. Brief description of work each sub will perform. (Roofing, HVAC, trash removal, consulting, etc)</p> <p>24. List project value total contracted with each sub-contractor / sub-consultant</p> <p>25. This month’s draw amount for each sub-contractor/ sub-consultant</p> <p>26. To date total billed to each sub-contractor / sub-consultant. The total amount summation must equal the % value listed in box number 17</p> <p>27. Start date for each sub-contractor / sub-consultant contract</p> <p>28. Scheduled completion date for each sub-contractor / sub-consultant contract</p> <p>NOTE:</p> <p>1. This form must be submitted with every pay application</p> <p>2. You must submit the partial release of liens with the pay application</p> <p>3. You must have a copy of the SBE certification for <u>every</u> certified SBE sub-contractor/ sub-consultant on the job</p> <p>4. If no SBE for reporting period is required, check the box indicating: “Note: SBE reporting for this pay period not applicable”</p> <p>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></p> |
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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: _____

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

- 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

- 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 Contractors 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

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

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.

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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

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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Section 01 33 00 Submittal Procedures

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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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Section 01 33 00 Submittal Procedures

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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.

DIVISION 1 – GENERAL REQUIREMENTS

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

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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- 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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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

SECTION 01 35 91 - HISTORIC TREATMENT 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 general protection and treatment procedures for the entire Project and the following specific work:
 - 1. Historic removal and dismantling.
- B. Related Sections:
 - 1. Division 04 Section "Maintenance of Unit Masonry" for specific requirements for cleaning and repairing clay masonry.
 - 2. Division 04 Section "Maintenance of Stone Assemblies" for specific requirements for cleaning and repairing stone.
 - 3. Division 05 Section "Maintenance of Decorative Metal" for specific requirements for cleaning and repairing ornamental metal.
 - 4. Division 08 Section "Historic Treatment of Wood Windows" for specific requirements for cleaning and repairing wood windows.
 - 5. Division 09 Section "Maintenance of Painting and Coating" for specific requirements for the stripping and repainting of decorative paint finishes.

1.3 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Dismantle: To disassemble and detach items by hand from existing construction to the limits indicated, using small hand tools and small one-hand power tools, so as to protect nearby historic surfaces; and legally dispose of dismantled items off-site, unless indicated to be salvaged or reinstalled.
- C. Existing to Remain: Existing items that are not to be removed or dismantled.
- D. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by the Architect.

- E. Refinish: To remove existing finishes to base material and apply new finish to match original or as otherwise indicated.
- F. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. Includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish, unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and in either the same or a similar material as the original, unless otherwise indicated.
- K. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- L. Retain: To keep existing items that are not to be removed or dismantled.
- M. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials, unless otherwise indicated.
- N. Salvage: To protect removed or dismantled items and deliver them to the Owner ready for reuse.
- O. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- P. Strip: To remove existing finish down to base material, unless otherwise indicated.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during removal and dismantling work remain Owner's property. Carefully dismantle and salvage each item or object.
- B. Coordinate with Owner's representative who will establish special procedures for dismantling and salvage.

1.5 SUBMITTALS

- A. Construction Schedule for Historic Treatments: Indicate for the entire Project the following for each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces:
 - 1. Detailed sequence of historic treatment work, with starting and ending dates, coordinated with Owner's continuing operations and other known work in progress.
 - 2. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
 - 3. Coordination of the continuing occupancy of the Owner and others in portions of the existing building and of the Owner's partial occupancy of completed Work.
 - 4. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without Contractor's professional engineer's certification that the structure can support the imposed loadings without damage.
- B. Qualification Data: Provide qualifications as specified in appropriate section for historic treatment specialist.
- C. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by historic treatment operations.

1.6 QUALITY ASSURANCE

- A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to this work as specified in each section, and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrate the firm's qualifications to perform this work.
 - 1. Field Supervisor Qualifications: Full-time supervisors experienced in historic treatment work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on Project site during times that historic treatment work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of the specialist firm.
 - 2. Worker Qualification: Persons who are experienced in historic treatment work of types they will be performing.
- B. Historic Treatment Program: Prepare a written plan for historic treatment for the whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures specified in this and other sections.
 - 1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
 - 2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.
- C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-prevention devices

during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include each fire watch's training, duties, and authority to enforce fire safety.

- D. Mockups: Prepare mockups of specific historic treatment procedures specified in this Section to demonstrate aesthetic effects and set quality standards for materials and execution.
- E. <<Edit these items to include those that apply to project(s)>>
 - 1. Typical Removal Work: Remove typical [wall area] [suspended ceiling assembly] <Insert description> as shown on Drawings.
 - 2. Typical Dismantling Work: Dismantle typical [fluorescent lighting fixture from ornamental plaster surface] [historic light fixture] <Insert description> as shown on Drawings.
 - 3. Typical Removal Work: Remove an [approximately 50 sq. ft.] <Insert dimension> area of typical [wall] [suspended ceiling assembly] <Insert description>, but not less than [10] <Insert quantity> adjacent whole [masonry] [stone] [ceiling tile] <Insert item> units:
 - 4. Typical Dismantling Work: Dismantle an [approximately 50 sq. ft.] <Insert dimension> area of typical [composition tile from mosaic tile substrate] <Insert description>, but not less than [10] <Insert quantity> adjacent whole [composition tile] <Insert item> units:
 - 5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- F. Regulatory Requirements: Comply with governing EPA notification regulations before beginning removal and dismantling work. Comply with hauling and disposal regulations of authorities having jurisdiction.
- G. Standards: Comply with ANSI/ASSE A10.6.
- H. Historic Treatment Preconstruction Conference: Conduct conference at [Project site] <Insert location>.
 - 1. General: Review methods and procedures related to historic treatment including, but not limited to, the following:
 - a. Review manufacturer's written instructions for precautions and effects of historic treatment procedures on materials, components, and vegetation.
 - b. Review and finalize historic treatment construction schedule; verify availability of materials, equipment, and facilities needed to make progress and avoid delays.
 - c. Review qualifications of personnel assigned to the work and assign duties.
 - d. Review material application, work sequencing, tolerances, and required clearances.
 - e. Review areas where existing construction is to remain and requires protection.
 - 2. Removal and Dismantling:
 - a. Inspect and discuss condition of construction to be removed or dismantled.
 - b. Review requirements of other work that relies on substrates exposed by removal and dismantling work.

1.7 STORAGE AND PROTECTION OF HISTORIC MATERIALS

PART 2 - << Edit this to describe any exploratory work>>

- A. Salvaged Historic Materials:
 - 1. Clean only loose debris from salvaged historic items unless more extensive cleaning is indicated.
 - 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area [on-site] [off-site] [designated by Owner] [indicated on Drawings].
 - 5. Protect items from damage during transport and storage.

- B. Historic Materials for Reinstallation:
 - 1. Repair and clean historic items as indicated and to functional condition for reuse.
 - 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.

- C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

- D. Storage and Protection: When taken from their existing locations, catalog and store historic items within a weather-tight enclosure where they are protected from wetting by rain, snow, condensation, or ground water, and from freezing temperatures.
 - 1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans elevations, sections, or photographs by annotating the identifying marks.
 - 2. Secure stored materials to protect from theft.

2.2 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to removal and dismantling area. Conduct removal and dismantling work so Owner's operations will not be disrupted.

- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Program Manager. Owner will remove hazardous materials under a separate contract.
 - a. In the case of asbestos, stop work in the area of potential hazard, shut off fans and other air handlers ventilating the area, and rope off area until the questionable material is identified. Re-assign workers to continue work in unaffected areas. Resume work in the area of concern after safe working conditions are verified.
- E. Storage or sale of removed or dismantled items on-site is not permitted unless otherwise indicated.

PART 3 - PRODUCTS - (Not Used)

PART 4 - EXECUTION

4.1 <<Edit these paragraphs as they apply to project>>

4.2 HISTORIC REMOVAL AND DISMANTLING EQUIPMENT

- A. Removal Equipment: Use only hand-held tools except as follows or unless otherwise approved by the Architect on a case-by-case basis:
 - 1. Light jackhammers are allowed subject to Architect's approval.
 - 2. Large air hammers are not permitted.
- B. Dismantling Equipment: Use manual, hand-held tools, except as follows or otherwise approved by the Architect on a case-by-case basis:
 - 1. Hand-held power tools and cutting torches are permitted only as submitted in the historic treatment program. They must be adjustable so as to penetrate or cut only the thickness of material being removed.
 - 2. Pry bars over 18 inches long and hammers weighing over 2 lb are not permitted for dismantling work.

4.3 EXAMINATION

- A. Preparation for Removal and Dismantling: Examine construction to be removed or dismantled to determine best methods to safely and effectively perform removal and dismantling work. Examine adjacent work to determine what protective measures will be necessary. Make explorations, probes, and inquiries as necessary to determine condition of construction to be removed or dismantled and location of utilities and services to remain that may be hidden by construction that is to be removed or dismantled.

1. Verify that affected utilities have been disconnected and capped.
2. Inventory and record the condition of items to be removed and dismantled for reinstallation or salvage.
3. Before removal or dismantling of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

B. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

C. Perform surveys as the Work progresses to detect hazards resulting from historic treatment procedures.

4.4 PROTECTION, GENERAL

A. Ensure that supervisory personnel are on-site and on duty when historic treatment work begins and during its progress.

B. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide barricades, barriers, and temporary directional signage to exclude public from areas where historic treatment work is being performed.
3. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of historic treatment work.
4. Contain dust and debris generated by removal and dismantling work and prevent it from reaching the public or adjacent surfaces.
5. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
6. Protect floors and other surfaces along haul routes from damage, wear, and staining.
7. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.

C. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not deface or remove existing materials.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

D. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

- E. Utility and Communications Services:
 - 1. Notify the Owner, Architect, and authorities having jurisdiction, owning or controlling wires, conduits, pipes, and other services affected by the historic treatment work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for the historic treatment work.
 - 3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

- F. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is in working order.
 - 1. Prevent solids such as stone or mortar residue from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
 - 2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

- G. Existing Roofing: Prior to the start of work in an area, install roofing protection as indicated.

4.5 PROTECTION FROM FIRE

- A. General: Follow fire-prevention plan and the following.
 - 1. Comply with NFPA 241 requirements unless otherwise indicated.
 - 2. Remove and keep area free of combustibles including, rubbish, paper, waste, and chemicals, except to the degree necessary for the immediate work.
 - a. If combustible material cannot be removed, provide fire blankets to cover such materials.
 - 3. Prohibit smoking by all persons within the Project work and staging areas.

- B. Fire Extinguishers, Fire Blankets, and Rag Buckets: Maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch are trained in fire-extinguisher and blanket operation.

4.6 GENERAL HISTORIC TREATMENT

- A. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

- B. Halt the process of deterioration and stabilize conditions, unless otherwise indicated. Perform work as indicated on Drawings. Follow the procedures in subparagraphs below and procedures approved in historic treatment program.
 - 1. Retain as much existing material as possible; repair and consolidate rather than replace.

2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 3. Use reversible processes wherever possible.
 4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
 5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs.
- C. Notify Architect of visible changes in the integrity of material or components whether due to environmental causes including biological attack, UV degradation, freezing, or thawing; or due to structural defects including cracks, movement, or distortion.
1. Do not proceed with the work in question until directed by Architect.
- D. Where missing features are indicated to be repaired or replaced, provide features whose designs are based on accurate duplications rather than on conjectural designs, subject to the approval of Architect.
- E. Where Work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.
- F. Identify new and replacement materials and features with permanent marks hidden in the completed work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on Record Drawings.

4.7 HISTORIC REMOVAL AND DISMANTLING

- A. General: Have removal and dismantling work performed by a qualified historic removal and dismantling specialist. Ensure that historic removal and dismantling specialist's field supervisors are present when removal and dismantling work begins and during its progress.
- B. Perform work in accordance with the historic treatment program and approved mockup(s).
1. Provide supports or reinforcement for existing construction that becomes temporarily weakened by the work, until the work is completed.
 2. Perform cutting by hand or with small power tools wherever possible. Cut holes and slots neatly to size required, with minimum disturbance of adjacent work.
 3. Do not operate air compressors inside building, unless approved by Architect in each case.
 4. Do not drill or cut columns, beams, joints, girders, structural slabs, or other structural supporting elements, without having Contractor's professional engineer's written approval for each location before such work is begun.
 5. Do not use explosives.
- C. Unacceptable Equipment: Keep equipment that is not permitted for historic removal or dismantling work away from the vicinity where such work is being performed.
- D. Removing and Dismantling Items On or Near Historic Surfaces:

1. Use only dismantling tools and procedures within [12 inches] <Insert dimension> of historic surface. Do not use pry bars. Protect historic surface from contact with or damage by tools.
 2. Unfasten items to be removed, in the opposite order from which they were installed.
 3. Support each item as it becomes loosened to prevent stress and damage to the historic surface.
 4. Dismantle anchorages.
- E. <<< Retain and revise remaining paragraphs to suit Project(s). Paragraphs below are examples only. >>>
- F. Masonry Walls:
1. Remove masonry carefully and erect temporary bracing and supports as needed to prevent unexpected collapse of materials being removed.
 2. Dismantle top edge and sides before removing wall. Stop removal work and immediately inform the Architect if any structural elements above or adjacent to the work show signs of distress or dislocation during any phase of removal work.
 3. Remove wall in easily managed pieces.
 4. During removal, the Contractor is responsible for the stability of the partially remaining wall. Notify the Architect of the condition of temporary bracing for wall if work is temporarily stopped during the wall's removal.
- G. Steelwork:
1. Expose all structural steel for examination by the Architect and the Contractor's professional engineer before proceeding with removal or dismantling.
 2. If any distress is shown by the structure during performance of the work, stop work and take immediate precautionary measures to ensure safety of the structure. Inform the Architect of the problem, the steps taken and proposed corrective actions.
 3. Brace and support structural steel being removed and remaining during all phases of the work.
 4. Concrete-Encased Steel: Where steel is known to be encased by concrete that will be removed, saw cut with blades that will cut no deeper than the thickness of the concrete cover with an adequate margin for error in the location of the steel. Isolate sections of concrete by saw cutting before beginning removal.
- H. Loose Plaster: Identify loose, non-historic plaster and separate it from its substrate by tapping with a hammer and prying with a chisel or screwdriver. Do not use pry bars. Leave sound, firmly adhered plaster in place. Do not damage, remove, or dismantle historic plasterwork except where indicated or where it is an immediate hazard to personnel and as approved by the Architect.
- I. Concrete Floor Surface Removal: Remove floor surfaces, fill, and topping, to the indicated lower elevations or cleavage planes as indicated on Drawings. Use dismantling methods when removing floor surfaces [12 inches] <Insert dimension> or less away from historic walls. Take away material to a uniform surface at the indicated level.

4.8 HISTORIC REMOVAL AND DISMANTLING SCHEDULE

4.9 <<Edit the following paragraphs to include only those applicable to project(s). >>

- A. Existing Construction to Be [Removed] [Dismantled]: <Insert description of items and construction to be removed>.
- B. Existing Items to Be [Removed] [Dismantled] and Salvaged: <Insert description of items to be dismantled and salvaged>.
- C. Existing Items to Be [Removed] [Dismantled] and Reinstalled: <Insert description of items to be removed or dismantled and reinstalled>.
- D. Existing Items to Remain: <Insert description of items to remain>.

END OF SECTION 01 35 91

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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.

DIVISION 1 – GENERAL REQUIREMENTS

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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

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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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

TAB SERVICES PROVIDED BY OWNER

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Owner will employ and pay for the service of an Independent Testing Agency for testing and balancing of HVAC systems.
 - 1. The testing, adjusting and balancing (TAB) of air conditioning systems will be performed by an impartial Independent Technical Firm whose operations are limited only to the field of professional TAB. TAB work shall be done under direct supervision of a professional engineer employed by the TAB firm.
 - 2. The Contractor shall cooperate with the Owner provided TAB firm; provide necessary data on design and proper application of system components; furnish labor and materials required to eliminate any deficiencies or mal-performance.

1.2 RELATED WORK

- A. Drawings and General Provisions of the Contract, including General, Supplementary and Other Conditions and Division – 1 Specifications Sections, apply to work of this Section.
- B. Refer to Division 23 and Division 26 for testing in conjunction with Mechanical and Electrical work.

1.3 LABORATORY DUTIES AND RESPONSIBILITIES

- A. HVAC Testing and Balancing:
 - 1. TAB firm shall act as liaison between Owner, Architect, and Contractor and inspect installation of mechanical piping systems, sheet metal work, temperature controls, and other component parts of heating, air conditioning and ventilating systems. Inspection of work shall cover that part relating to proper arrangement and adequate provisions for testing and balancing.
 - 2. Upon completion of installation and start-up on mechanical equipment, check, adjust and balance system components to obtain optimum conditions in each conditioned space in building. TAB agency to submit to Owner, or Owner's delegated representative, complete reports on the balance and operation of systems.

1.4 CONTRACTOR'S RESPONSIBILITIES

- A. HVAC Testing, Adjusting and Balancing
 - 1. Have all systems complete in operational readiness prior to notifying TAB firm that Project is ready for their services, and so certify in writing to Owner that such a condition exists.
 - 2. Make any changes in sheaves, belts and dampers or the addition of dampers required for correct balance as required by TAB firm, at no additional cost to the Owner.
 - 3. Provide and coordinate services of qualified, responsible subcontractors, suppliers and personnel as required to correct,

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Section 01 45 23.01 HVAC Testing, Adjusting and Balancing

- repair or replace any and all deficient items or conditions found during that testing, adjusting and balancing period.
4. In order that systems may be properly tested, balanced and adjusted as required by these specifications, operate said systems for length of time necessary to properly verify their completion and readiness for TAB and pay costs of operations during TAB period.
 5. Provide time frame allowance in Contract completions schedule to permit completion of TAB services prior to Owner occupancy.
 6. Should TAB be so notified and TAB work commences and the systems are found to not be in readiness or a dispute occurs regarding the readiness of systems, Contractor shall request an inspection be made by a duly appointed representative of Owner, Architect, TAB firm and Contractor. This inspection shall establish to the satisfaction of represented parties whether or not systems meet basic requirements for TAB services. Should inspection reveal TAB services notification to have been premature, Contractor shall pay for costs of the inspection and work previously accomplished by TAB firm. Furthermore, such items as are not ready for TAB services shall be completed placed in operations readiness and TAB services shall again be required.
 7. Complete operational readiness, prior to commencement to TAB services shall include the following:
 - a. Construction status of building permits closing of doors, windows and ceilings installed to obtain projected operational conditions.
 8. Air Distribution Systems:
 - a. Verify installation for conformity to design. Supply, return and exhaust ducts terminated and pressure tested for leakage as required by Specifications.
 - b. Volume and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return and relief, shall provide tight closure and smooth operation.
 - c. Supply, return, exhaust and transfer grills, registers, diffusers and terminal units installed.
 - d. Air handling systems, units and associated apparatus, such as filter sections and access doors, shall be blanked or sealed to eliminate excessive bypass or air leakage.
 - e. Fans (supply, return, and exhaust) operating and verified for freedom from vibration, proper fan rotation and belt tension; heater elements shall be proper size and rating; record motor amperage and voltage and verify name plate ratings are not exceeded.

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Section 01 45 23.01 HVAC Testing, Adjusting and Balancing

9. Water Circulating Systems:
 - a. Check and verify pump alignment and rotation.
 - b. Position and valves pertinent to system design and require operation to permit full flow of water through system components. Operate hydronic systems under full flow conditions until circulating water is clean. Strainers shall be removed and cleaned as required during this cycle of operation.
 - c. Record each pump motor amperage and voltage. Readings shall not exceed nameplate rating.
 - d. Verify electrical heater elements to be of proper size and rating.
 - e. Water circulating systems shall be full of water and free of air, expansion tanks set for proper water level and air vents installed at high points of systems and operating freely.
 - f. Check and set operating temperature of heat exchangers to design requirements.
 - g. Contractor to provide labor and chemical to clean and flush all chill water piping system. Contractor to coordinate with treatment provider to be sure chemicals used are compatible with owner's providers.
10. Automatic Controls:
 - a. Verify that control components are installed in accordance with Project requirements and functional, including electrical interlocks, damper sequences, firestats, CO2 sensors, and smoke detectors.
 - b. Controlling instruments shall be functional and set for designed operating conditions. Factory pre-calibration of thermostats will not be acceptable.
 - c. Temperature regulation will be adjusted for proper relationship between controlling instruments and calibrated by control subcontractor using data submitted by TAB firm. The correctness of final setting shall be proved by taking hourly readings for a period for three (3) successive 8-hour days in a typical room on each separately controlled zone. Total variation shall not exceed two (2) degrees from present median temperature during entire temperature survey period.
11. TAB firm will not instruct or direct Contractor in any of the work, but will make such reports as are necessary direct to Owner. Plans and miscellaneous adjustment devices for purpose of adjustment to obtain optimum operation conditions; install these devices in a manner that will leave them accessible and readily accessible, provide access as required by TAB firm.
12. .
13. Provide approved submittal data on equipment installed and related changes required to accomplish test procedures outlined in this Section of the Specification.
14. Transmit one (1) copy of the following 'Record for Owner' to TAB firm for review and comments:
 - a. 'As installed' drawings.

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- b. Approved Fixture Brochure.
 - c. Approved Wiring Diagrams.
 - d. Approved Control Diagrams.
 - e. Approved Sequence of Operations
 - f. Shop Drawings.
 - g. Instructions.
 - h. Valve Charts.
 - i. Approved submittals for equipment, devices and accessories
- 1.5 Typical TAB Agency duties for HVAC TESTING, ADJUSTING AND BALANCING
- A. Testing and Balancing Air Systems:
 1. Test and adjust air systems to conditions set forth in Plans and Specifications. Air systems include:
 - a. Supply Air Systems.
 - b. Return Air Systems.
 - c. Exhaust Air Systems.
 2. In fan systems, air quantities indicated on Plans may be varied as required to secure a maximum temperature variation of two (2) degrees within each controlled space, but total air quantity indicated for each zone must be obtained.
 3. Test and adjust blowers and fan to deliver CFM required by systems with concurrent recording of RPM, supply voltage and full load amperes. Report any changes of belts and sheaves required.
 4. Mark pitot tube traverses of main supply, return and exhaust ducts and adjust fans and dampers to achieve specified air volumes. Patch and cover the pilot tube holes after air balancing is complete.
 5. Test and adjust fresh air intake and return air dampers and louvers to conditions scheduled or required.
 6. Test and record static pressure on entering and leaving side of each supply fan, exhaust fan filter, coil and balancing dampers and other components of the system.
 7. Test and adjust supply air diffusers, grills, and return air registers to Specification requirements and as shown on Drawings. Adjust supply diffuser patten blades for proper air distribution in each room or space.
 8. Measure temperature in each space and concurrent outside temperature.
 - B. Testing and Adjusting of Water System:
 1. Flow of water through water coils shall be adjusted by adjusting valves until rated pressure drop across each coil is obtained and water flow verified by veturi readings. On those with three-way valves, rated pressure drop shall first be adjusted though coils in each of several systems and the temperature differential between inlet and outlet shall be determined to be in accordance with its rating. Bypass valves shall then be adjusted on each coil until an equal pressure drop between supply and return

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- connections is obtained with three-way valves set to bypass all coils in each of the several systems.
2. Geothermal Heat Pumps TAB shall be performed with a single unit per well field operating. This single unit balancing shall include both the air side, particularly the outside air, and the water side.
- C. Testing and Adjusting of Automatic Controls:
1. Test automatic controls, controlled devices, interlocks, safety devices associated with HVAC system for proper operation and sequence during heating, cooling, intermediate and smoke removal modes of operation. Adjust automatic controls to deliver required quantities of air at temperatures specified or scheduled on Plans and to maintain proper conditions in each room of the building.
 2. Report deficiencies or malfunctions to Owner or owner's representative.
- D. Marking of Settings:
1. Before final acceptance of reports is made, TAB firm shall furnish Owner the following data:
 - a. Summary of main supply, return and exhaust dust pilot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.
 - b. A tabulated record of temperature in all spaces on each separately controlled zone, together with outside temperature at time of measurement.
 - c. A list of measured air quantities at each outlet corresponding to temperature tabulation specified above.
 - d. Air quantities at each return and exhaust air-handling devices.
 - e. Supply pressure readings entering and leaving each supply fan, exhaust fan, filter, balancing dampers and other components of system. These readings shall be related to fan curves in terms of CFM handled.
 - f. Motor current readings per phase at each equipment motor. Voltage at time of reading shall be listed.
 - g. Water pressure reading at gauge connections. Pressure readings at coils and pumps shall be related to coil and pump curves in terms of GPM flow through metering stations at each coil if applicable.
 - h. Water temperature readings entering and leaving each coil and heat exchanger under maximum load conditions in each case.
 2. The final report shall certify test methods and instrumentation used, final velocity ready obtained, air quantities at each outlet supply, return, exhaust, temperature, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items.
 3. A summary of actual operating conditions shall be included on each system outlining normal and/or ventilation cycles of

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Section 01 45 23.01 HVAC Testing, Adjusting and Balancing

-
- operation. The intent of final report will provide a reference of actual operating conditions for Owner's operating personnel.
4. '
 5. Insure that all systems area balanced at the proper time in the opposite season.

PART 2 PRODUCTS (Not Applicable)

End of Section 01 45 23 01

PART 1 SERVICES - GENERAL

1.1 WORK INCLUDES

- A. This Section specifies administrative and procedural requirements for testing and inspection services.
- B. Services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 2. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 3. Requirements for the Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 RESPONSIBILITIES

- A. Contractor Responsibilities: The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity; these services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.
 1. The Contractor shall employ and pay an independent agency, to perform specified quality control services specified in PART 1 - GENERAL, QUALITY ASSURANCE. The cost for these services is not borne by the testing allowance.
 2. The Owner will engage the services of an independent agency to perform inspections and tests specified in PART 3 - EXECUTION, QUALITY CONTROL, QUALITY CONTROL TESTING DURING CONSTRUCTION or FIELD QUALITY CONTROL.
 3. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity

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Section 01 45 23.02 Testing and Inspection

- engaged by the Owner, unless otherwise agreed in writing with the Owner.
4. Retesting: The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 5. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
 6. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
 - e. Security and protection of samples and test equipment at the Project site.
- B. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.
1. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.
 2. The Owner will employ and pay for the services of an independent Commissioning Agent, TAB services, and Material Testing services.
- C. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the Architect and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
1. The agency shall notify the Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 45 23.02 Testing and Inspection

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2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 3. The agency shall not perform any duties of the Contractor unless informed in writing by the owner or owner's representative.
- D. Coordination: The Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. Additionally, Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.3 SUBMITTALS

- A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate or pdf format, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate and pdf format.
- B. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
- C. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 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 the inspection or test.
 6. Designation of the Work and test method.
 7. Identification of product and Specification Section.
 8. Complete inspection or test data.
 9. Test results and an interpretation of test results.
 10. Ambient conditions at the time of sample-taking and testing.
 11. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting.

1.4 QUALITY ASSURANCE

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
 1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 45 23.02 Testing and Inspection

1.5 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements at no additional cost to the Owner.
- B. If, in the opinion of the Architect/Engineer or Owner, it is not practical to remove and replace the Work, the Architect or owner's representative will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but sum/price will be adjusted to new sum/price at the discretion of Architect or Owner.
- D. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- E. Authority of Architect/Engineer, or other appropriate agent identified to perform assessment by the Architect/Engineer or Owner, to assess defects and identify payment adjustments, is final.
- F. Non-Payment For Rejected Products: In addition to replacement of rejected Work, payment will not be made for rejected products for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from transporting vehicle.
 - 4. Products placed beyond lines and levels of required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected products.

PART 3 - EXECUTION

3.1 SCHEDULE OF INSPECTIONS AND TESTS

Any conflicts with the information below with current best practices, building code requirements, jurisdictional requirements or other agreements the more stringent applies.

- A. Soils Tests:
 - 1. Soil Analysis Method: Make one test for each type of soil used under structures and paving.
 - a. Liquid Limit ASTM 04318.
 - b. Plastic Limit: ASTM 04318.
 - c. Plasticity Index: ASTM 04318.
 - d. Moisture-Density Relationship: ASTM 0698 or ASTM D4253, 04254 as applicable.
 - e. In-Place Density: ASTM 02922.
 - f. One laboratory maximum density test.
 - 2. Quantity of Analysis: One set for each 5000 sf for each lift
 - a. Perform in-place density tests on fill material at building, paving, and utility trenches.
- B. Soil Stabilization:
 - 1. Required Analyses for Fill
 - a. Liquid Limit ASTM 04318.
 - b. Plastic Limit, Plasticity Index ASTM 04318.
 - c. Moisture-Density Relationship: ASTM 0698 or ASTM 04253, 04254 as applicable.
 - d. In-Place Density: ASTM 02922.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 45 23.02 Testing and Inspection

2. Quantity of Analyses: One set for each 5000 square feet.
- C. Portland Cement Concrete Paving:
1. Three (3) concrete test cylinders will be taken for every 100 or less cubic yards of concrete placed.
 2. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on jobsite under same conditions as concrete it represents.
 3. One (1) slump test will be taken for each set of test cylinders taken.
 4. One (1) set of manufacturer's test data will be required of Contractor for each type reinforcing steel purchased directly from a United States mill.
 5. One (1) set of tension and bending tests on three separate samples for each bar size of each 5 tons of each type reinforcing steel specified.
 6. Cylinder Curing: ASTM C31.
 7. Testing Cylinders: ASTM C39. Test one cylinder for compression at 7 days, one at 28 days, hold one cylinder for testing at 56 days if 28 day test does not meet specified compression strength.
 8. Report test results promptly. ASTM C94 governs acceptance of tested concrete.
 9. Drill and test cores as required when 28-day test results fall below specified strengths. Contractor shall pay for drilling and testing cores.
- D. Asphalt Pavement:
1. Verify Contractor's mix design for compliance.
 2. Required Plant Sampling and Testing
 - a. Sieve Analysis of Aggregates ASTM C136.
 - b. Sampling Mineral Aggregates: ASTM D75.
 - c. Sieve Analysis of Mineral Filler: ASTM D546.
 - d. Specific Gravity of Coarse Aggregate: ASTM C127.
 - e. Specific Gravity of Fine Aggregate: ASTM C128.
 - f. Sampling Bituminous Materials: ASTM D140.
 - g. Sampling Bituminous Mixtures: ASTM D979.
 - h. Determination of Bitumen Content: ASTM D2172.
 - i. Liquid Limit, Plastic Limit, Plasticity Index: ASTM D4318.
 - j. Percentage of Coated Particles: ASTM D2489.
 - k. Recovery of Extracted Asphalt: ASTM D1856
 - l. Penetration of Recovery Asphalt: ASTM D5
 - m. Percent of Air Voids in a Compacted Bituminous Paving Mixture: ASTM D3203.
 - n. Absolute Viscosity of Asphalts: ASTM D2171.
 - o. Cohesion, Resistance to Deformation: ASTM D1560.
- E. Field Density Tests: ASTM D2950.
- a. Locations: Subgrade, base courses, surface course.
 - b. Number: One for each 1,000 square yards or fraction thereof.
 - c. Field Thickness: ASTM D3549.

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Section 01 45 23.02 Testing and Inspection

- F. Drilled Footing Inspection:
 - 1. Soil Shear Strength Test: Test sample of cuffing from each drilled footing with a pocket penetrometer to determine shear strength and compare with anticipated strength presented in the soil report.
 - 2. Visual Inspection: Determine that cutting tool is set for the correct size. Inspect each drilled footing to determine if the bottom of the excavation is in intended strata of soil type and is free of loose dirt and sand. Notify Architect and Geotechnical Engineer if water is encountered.
 - 3. Reinforcing Steel: Inspect the reinforcing steel to determine if the size and number of reinforcing bars complies with the specifications and drawings.
 - 4. Maintain record of footing depth and variations of installation if footing placement requires deviation from Contract Documents.
- G. Structural Concrete:
 - 1. Aggregate Tests:
 - a. Typical: Check the proposed aggregate in accordance with ASTM C33.
 - b. For concrete 6000 psi and higher, perform ASTM 0799 also.
 - 2. Mix Design: Check the proposed mixes for proportions, water cement ratio and slump in accordance with ACI 301 and 318.
 - 3. Slump Tests: Take slump tests per ASTM C143 at the beginning of each day's placing operations and whenever water adjustments or noticeable change of slump occurs, with a minimum of one for each set of test cylinders.
 - 4. Sampling:
 - a. Make five standard cylinders at the beginning of each placement, and five more standard cylinders for every 50 cubic yards placed. Take extra samples at noticeable change in the concrete makeup. Cure per ASTM C192.
 - b. Determine and report air content per ASTM C231, 0173, or 0138 for each set of test cylinders.
 - c. Perform sampling in compliance with ASTM 0172.
 - d. Samples for pumped concrete to be taken at end of line, at location of placement.
 - 5. Testing:
 - a. Test cylinders for compression in accordance with ASTM 039.
 - b. Test two lab cured cylinders at 7 days and two field cured cylinders at 28 days averaging test results. Store one (1) cylinder for testing at 56 days in the event the 28 days strength tests do not meet strength requirements.
- H. Reinforcing Steel:
 - 1. Visual Inspection: Inspect reinforcing steel in structural concrete to determine if the size, type, splices, laps, clearances, and number of reinforcing bars complies with the specifications and drawings.

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Section 01 45 23.02 Testing and Inspection

- I. Bolted Connections:
 - 1. Types:
 - a. Calibrated torque wrench if washers are used.
 - b. If turn of nut method is used without washers, observe the set of every bolt.
 - 2. Number for Torque Wrench Test: Test minimum two bolts of every third connection between floor beams, girders and columns.
 - 3. Analysis: If insufficient torque occurs on any tested bolt, test all bolts at that connection at the Contractor's expense.
- J. Steel Weld Tests:
 - 1. Types: One of the following testing procedures may be used on any field or shop weld.
 - a. Liquid penetrant.
 - b. Magnetic particle.
 - c. Radiographic.
 - d. Ultrasonic.
 - e. Visual inspection at small welds.
 - 2. Number of Tests: 100% of full penetration and field welds, 10% of other shop welds. Test of shop welds shall be done at fabricator's shop prior to painting and shipping.
 - 3. Number of Retests: Number of welds to be retested will be determined by the number of welds that fail the initial testing.
 - 4. All welds that fail shall be re-welded and retested until they pass the test. 5. Test two additional welds for every weld failure at the Contractor's expense.
 - 5. Weld Quality: Comply with the quality requirements of the American Institute of Steel Construction Manual of Steel Construction.
 - 6. Testing Laboratory shall obtain and review copy of certification of all welders.
- K. Insulating Concrete:
 - 1. Type of Tests:
 - a. Field Wet Density: ASTM C138.
 - b. Laboratory Tests: Dry density and compressive strength ASTM C495.
 - 2. Number of Test Sets:
 - a. One per 5,000 square feet.
 - b. Not less than one for each day's work.

End of Section 01 45 23 02

DIVISION 1 – GENERAL REQUIREMENTS
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

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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Section 01 50 00 Temporary Facilities and Controls

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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Section 01 50 00 Temporary Facilities and Controls

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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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 50 00 Temporary Facilities and Controls

- 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 50 00 Temporary Facilities and Controls

- 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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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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 50 00 Temporary Facilities and Controls

- 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

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 52 14 Temporary Facilities for Students

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 00 and 01 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Section includes requirements for temporary facilities (Swing Space) for the purpose of relocating students to provide temporary classroom facilities during construction activities.

- B. Related Sections:

- 1. Division 00 Section titled “Technical Proposal”
- 2. Division 01 Section title “Temporary Facilities and Controls”

1.3 DESCRIPTION OF REQUIREMENTS

- A. The project management team are to determine whether Swing Space is necessary in order to accommodate the phasing and construction of the project. If students must be displaced from classroom areas due to the phasing and execution of the work according to the Contractor’s work plan, the Contractor shall be responsible for providing, on a turn-key basis, temporary facilities for those displaced students. It will be the responsibility of the Contractor to determine the size and layout of the space based on the particular need and in a manner that will create an adequate classroom facility for the students displaced. Every effort shall be made to avoid temporary portables as swing space, unless there are already in existence at the school, unused. Contractor, PM, and Architect must work with School Principal to find swing space within the school by accommodating school master schedule and space allocation.
- B. If the Contractor elects to utilize Swing Space, they must include all costs associated with the procurement including, but not limited to:
 - 1. Equipment purchase or leasing
 - 2. Transport and setup
 - 3. Maintenance of the temporary facilities for the duration of their use (i.e. HVAC, electrical, and other building repair and maintenance needed, not custodial maintenance)
 - 4. Site work and utilities
 - 5. ADA/TAS Accessible ramps and sidewalks
 - 6. Stairs
 - 7. Skirting
 - 8. Interior finish-out
 - 9. Miscellaneous specialties (i.e. marker boards, tack boards, flag holders, map clips, fire extinguishers)
 - 10. Signage
 - 11. Wall Clock and bell to interface with the existing system at the school
 - 12. Furnishings, Fixtures, and Equipment (FF&E)
 - 13. Breakdown, removal, and transport of the Swing Space at the completion of its use
 - 14. Restoration of the site following removal of facilities
 - 15. P.A. to interface with the existing system at the school

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 52 14 Temporary Facilities for Students

16. Data cabling from existing school network electronics sufficient to provide two data drops at each Teacher's desk location.

1.4 SCOPE OF WORK

Provide turnkey services for delivery, set-up, maintenance, removal, and restoration of the site for temporary classroom buildings to accommodate phased construction.

- A. Engineering: The Contractor will provide site engineered civil, utility, blocking plan/foundation plan, sidewalk design and deck/ramp design sufficient to receive a Building Permit from the municipality having jurisdiction, for each site for the installation of all temporary classroom buildings.
- B. Architectural: The Contractor will provide the building manufacturer's shop drawings approved by the Texas Department of Licensing and Regulation (TDL&R). The Contractor will coordinate T.A.S. submittals to the State and the City as they relate to this scope of work.
- C. Permits: The Contractor will coordinate and obtain the permits as required by the City for placement of the classroom buildings at each site. This includes the permits required for the transportation of the classroom buildings.
- D. Temp. Facilities: Roll off dumpsters will be provided by the Contractor as required for clean-up during installation and removal of swing space.
- E. Clean up: Final broom sweep of the building(s) and removal of trash and debris from each site will be provided by the Contractor prior to occupancy of the swing space by the students and staff. Floor waxing or shampooing will be provided by the Contractor prior to occupancy by the students and staff if needed. Provisions for site restoration upon completion of the delivery of the modules and/or completion of the scope of work will be provided by the Contractor. Upon the removal of the buildings all underground utilities and/or structures associated with the temporary classroom buildings will be removed and discarded. The concrete sidewalks will be removed and discarded. Rough grading will be performed and new sod will be placed to restore the area to its original condition.
- F. Site Prep: FBISD has made no provisions for any site preparation and/or demolition as may be required for the delivery and/or installation of the portable buildings. Any site preparation and/or demolition that might be required of for installation of the temporary classrooms will be included in the Contractor's scope.
- G. Construction Fencing: The contractor will maintain a clean and safe site environment within the limits of the temporary classroom construction area. Temporary chain link construction fencing 6' high will be installed around the perimeter of the limits of construction.
- H. Sodding: Upon the removal of the buildings, the Contractor will provide sod within the limits of construction associated with the temporary classroom scope of work. Any irrigation of the new sod will be provided by FBISD.
- I. Site Utilities (if applicable): The Contractor will provide the site utility connections as required for the temporary classroom buildings. If needed,

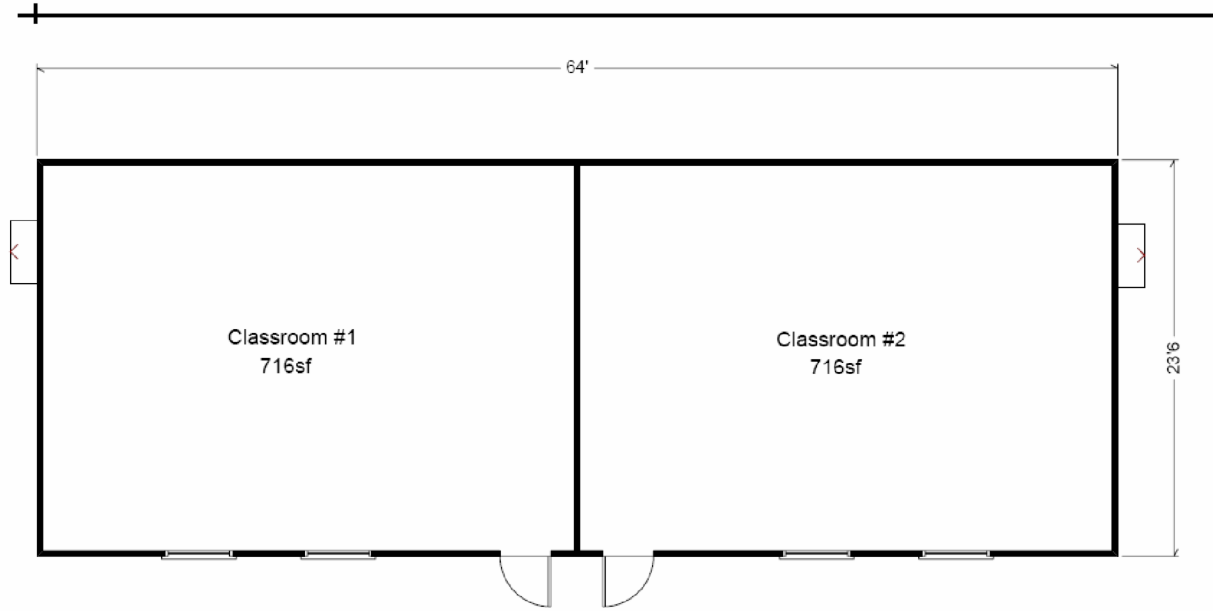
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Section 01 52 14 Temporary Facilities for Students

- PM shall negotiate with municipalities having jurisdiction obtaining a variance to the FBISD in which the swing space facilities are not required to have restroom facilities. If required by those municipalities, the Contractor must provide restroom services and utilities as required by local code.
- J. Storm: All storm water management and any sedimentation control will be the responsibility of the Contractor. Gutters and downspouts will be installed as needed by the Contractor.
 - K. Sanitary (if applicable): The Contractor will install all fixtures, stub all sanitary lines below the floor and manifold to one location at the edge of the building(s). All final connections, utility company charges and impact fees that might be required will be included in the Contractor's scope of work. If needed, PM shall negotiate with municipalities having jurisdiction obtaining a variance to the FBISD in which the swing space facilities are not required to have restroom facilities. If required by those municipalities, the Contractor must provide restroom services and utilities as required by local code.
 - L. Water (if applicable): The Contractor will install all fixtures and stub all water lines to one location at the edge of the building(s). All final connections, utility company charges and impact that might be required will be included in the Contractor's scope of work. If needed, PM shall negotiate with municipalities having jurisdiction obtaining a variance to the FBISD in which the swing space facilities are not required to have restroom facilities. If required by those municipalities, the Contractor must provide restroom services and utilities as required by local code.
 - M. Natural Gas: No provisions for any gas service are anticipated for FBISD Projects.
 - N. Life Safety: Building(s) will be approved and inspected by the Texas Department of Licensing and Regulation. Any provisions for fire suppression, fire sprinkler system or fire rated assemblies that might be required will be included in the Contractor's scope of work.
 - O. Fire Alarm: The contractor will provide and install fire detection systems as required by the building code and the City.
 - P. Electrical: The contractor will provide and install electrical systems as required by the building code and the City. Temporary electricity costs associated with the swing space will be the financial responsibility of the Contractor unless otherwise directed by the owner in writing.
 - Q. Mechanical: The Contractor will supply and install the standard end mount HVAC units as provided by the portable building manufacturer. The condensate from both HVAC units of a classroom building will be harnessed together and discharged into a 24" diameter by 36" deep french drain filled with gravel. All condensate piping will be PVC but will be protected where directly exposed to UV radiation.
 - R. Skirting: After the modules are installed, the Contractor will install full perimeter skirting around the building(s) using the same material and finish as that of the building siding to provide a consistent finish down to grade. Sections of skirting will be perforated as required for proper crawl

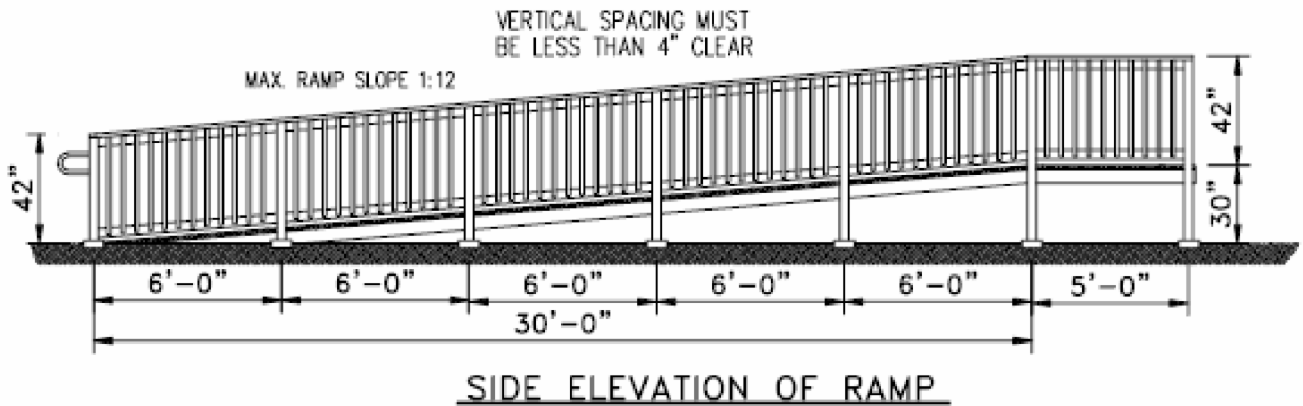
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- space ventilation. Access to the crawl space will be accomplished by removing sections of the skirting.
- S. Decks/Stairs: The Contractor will install landings at the exit doors of the building(s) within the limits of construction as required by code and the City. Landings will utilize pressure treated wood construction with slip resistant surface treatment and handrails.
 - T. Ramps: The Contractor will install handicapped accessible ramps at the exit doors of the building(s) within the limits of construction as required by code and the Local City. Ramps will utilize pressure treated wood construction with slip resistant surface treatment and handrails.
 - U. Sidewalks: The Contractor will install 4' wide, 4" thick, 3,000 psi concrete sidewalks using 6x6 welded wire reinforcing to service the building(s) within the limits of construction. Sidewalks will receive a light broom finish and be poured on select fill and/or sand bed.
 - V. Foundation and Anchorage: The swing space facilities should be securely anchored to a foundation system which utilizes some means of structural support, as determined by a certified structural engineer. Provide construction documents that depict the foundation system as designed and certified by a structural engineer. The portable buildings shall be anchored to the foundation components in a manner that is structurally sound and that is acceptable to the building manufacturer and the structural engineer.
 - W. Hitch/Tires/Axles: Hitches will be removed and stored under building while tires and axles are to remain on the modules. Tires and axles will be removed only if necessary to complete the building installation due to site constraints and will also be placed under the modules.
- 1.5 Furniture, Fixtures, and Equipment (FF&E)
- A. The Contractor shall furnish and set in place all FF&E items necessary for a functional classroom. The furniture may be provided by FBISD, but will be the full responsibility of the contractor to move to site and back to origin. These items should include, at a minimum: student desks and chairs, teacher desk and chair, one 4-drawer vertical file cabinet, one portable teacher storage cabinet for coat and other storage, student storage cubbies/shelving and coat hooks, and computer station desks and chairs.
- 1.6 Drawings
- A. The following is a typical floor plan design guideline drawing:

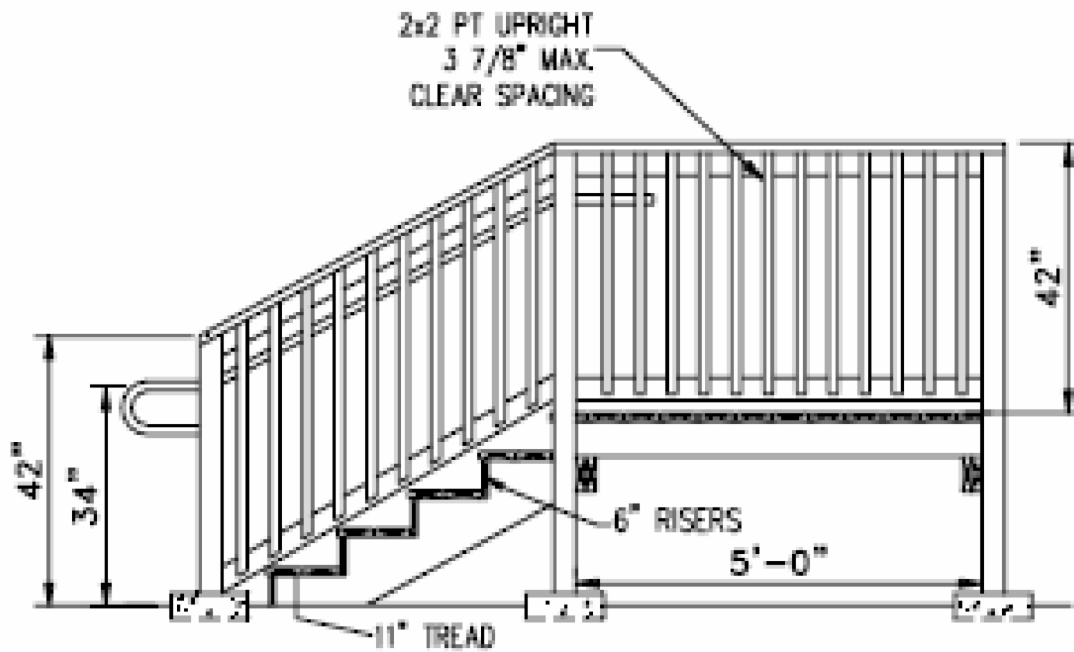
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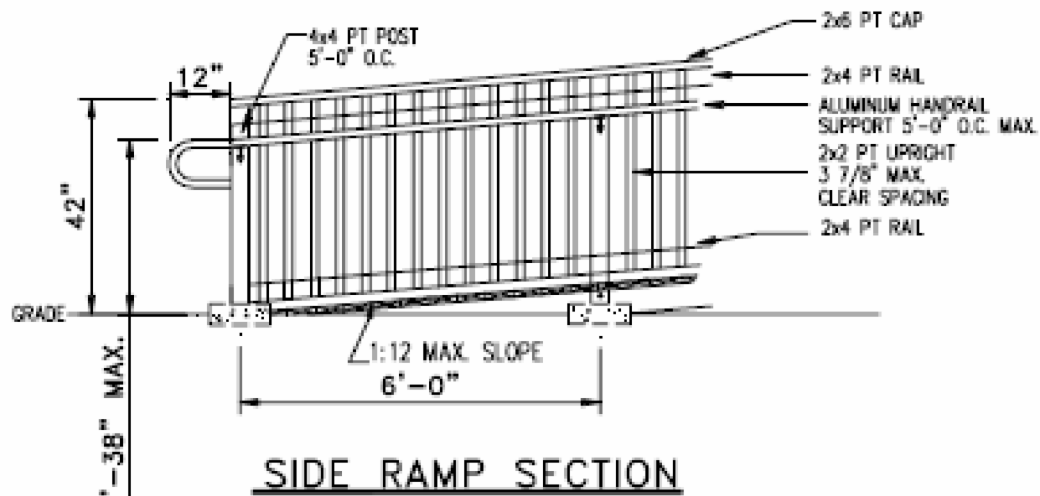
A. The following design guideline drawings are to be used for ramps/walkways:



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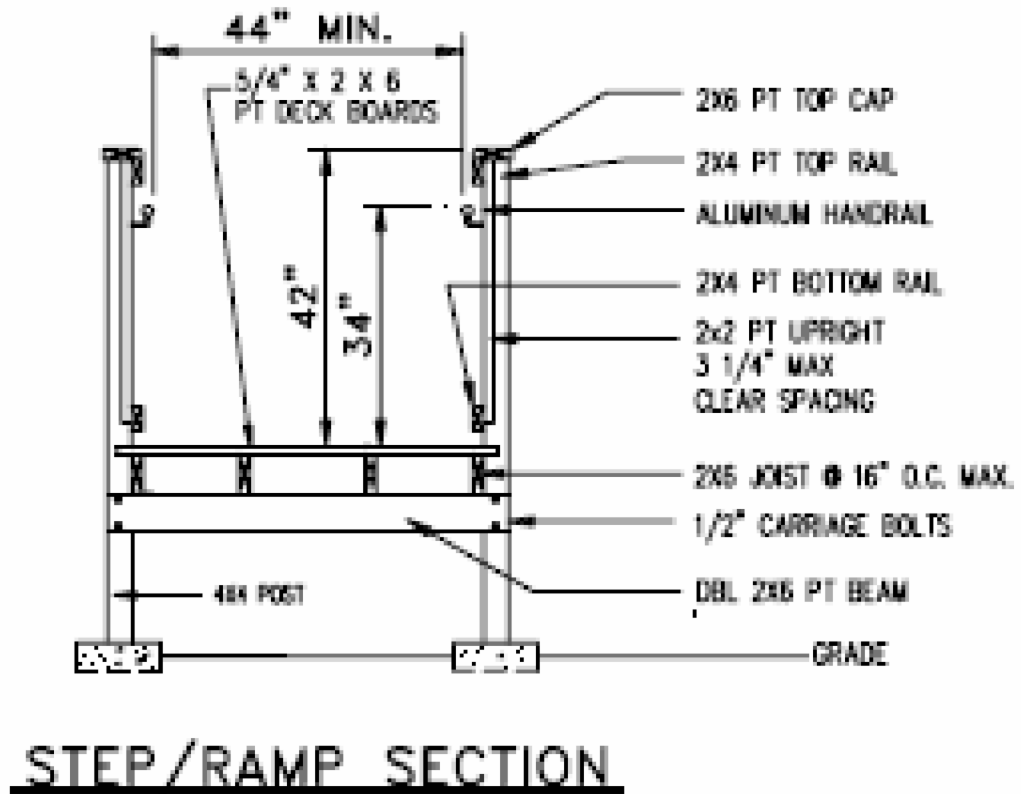


SIDE ELEVATION OF STEP

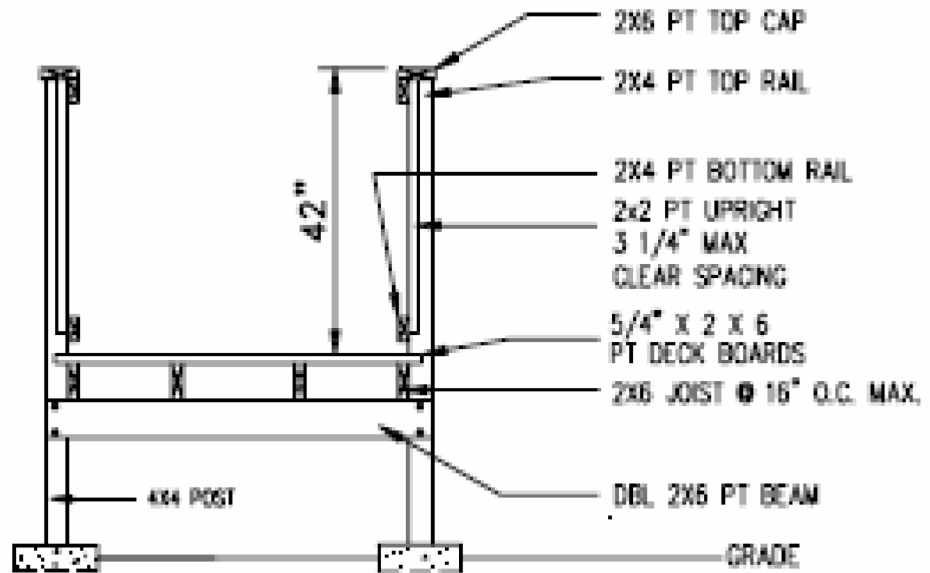


SIDE RAMP SECTION

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DIVISION 1 – GENERAL REQUIREMENTS
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ELEV. WALKWAY SEC 'A'

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End of Section 01 52 14

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

-
- 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

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

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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 56 39 Temporary Tree and Plant Protection

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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 56 39 Temporary Tree and Plant Protection

- 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.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 56 39 Temporary Tree and Plant Protection

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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Section 01 56 39 Temporary Tree and Plant Protection

- 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 or 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 10 TPDES Requirements

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Documentation to be prepared and signed by Contractor before conducting construction operations, in accordance with the Texas Pollutant Discharge Elimination System (TPDES) Construction General Permit Number TXR 150000 (the Construction General Permit).
- B. Implementation, maintenance, inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other appropriate practices shown on the Drawings or specified elsewhere in the Contract.
- C. Review of the Storm Water Pollution Prevention Plan (SWP3) implementation in a meeting with the Owner's Representative prior to start of construction.

1.2 DEFINITIONS

- A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavating.
- B. Large Construction Activity: Project that:
 - 1. Disturbs five acres or more, or
 - 2. Disturbs less than five acres but is part of a larger common plan of development that will disturb five acres or more of land.
- C. Small Construction Activity: Project that:
 - 1. Disturbs one or more acres but less than five acres, or
 - 2. Disturbs less than one acre but is part of a larger common plan of development that will ultimately disturb one or more acres but less than five acres.
- D. TPDES Operator:
 - 1. The person or persons who have day-to-day operational control of the construction activities which are necessary to ensure compliance with the SWP3 for the site or other Construction General Permit conditions.

1.3 SUSTAINABLE DESIGN (LEED) REQUIREMENTS

- A. New Schools shall be LEED Certified Projects.

PART 2 PRODUCTS- Not Used

PART 3 EXECUTION

3.1 SITE SPECIFIC STORM WATER POLLUTION PREVENTION PLAN (SWP3)

- A. Prepare a SWP3 following Part III of the Construction General Permit and the applicable local code. If conflicts exist between the Construction General Permit and the local regulations, the more stringent requirements will apply.
- B. Update or revise the SWP3 as needed during the construction following Part III, Section E of the Construction General Permit.
- C. Submit the SWP3 and any updates or revisions to the Owner's Representative for review and address comments prior to commencing, or continuing, construction activities.

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 10 TPDES Requirements

3.2 NOTICE OF INTENT FOR LARGE CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date TCEQ Form 20022 Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR 150000). Contractor shall provide NOI forms for both himself and Owner.
- B. Transmit the signed Contractor's copy of TCEQ Form 20022, along with a check for the required fee, made out to Texas Commission on Environmental Quality.
- C. Submission of the Notice of Intent form by the Contractor to TCEQ is required a minimum of fourteen days before Commencement of Construction Activities.

3.3 CONSTRUCTION SITE NOTICE FOR SMALL CONSTRUCTION ACTIVITY

- A. Fill out, sign, and date the Construction Site Notice, Attachment 2 to TPDES General Permit TXR 150000, "Construction Site Notice."
- B. Transmit the signed Construction Site Notice to the Engineer and Owner at least seven days prior to Commencement of Construction Activity.

3.4 CERTIFICATION REQUIREMENTS

- A. Conduct inspections in accordance with TCEQ requirements. Ensure persons or firms responsible for maintenance and inspection of erosion and sediment control measures read, fill out, sign, and date the Erosion Control Contractor's Certification for Inspection and Maintenance. Use the EPA NPDES Construction Inspection Form.

3.5 RETENTION OF RECORDS

- A. Keep a copy of this document and the SWP3 in a readily accessible location at the construction site from Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR 150000). Contractors with day-to-day operational control over SWP3 implementation shall have a copy of the SWP3 available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWP3. Upon submission of the NOT, submit all required forms and a copy of the SWP3 with all revisions to the Owner's Representative.

3.6 REQUIRED NOTICES

- A. Post the following notices from effective date of the SWP3 until date of final site stabilization as defined in the Construction General Permit:
 - 1. Post the TPDES permit number for Large Construction Activity or a signed TCEQ Construction Site Notice for Small Construction Activity. A signed copy of the Contractor's NOI must also be posted.
 - 2. Post notices near the main entrance of the construction site in a prominent place for public viewing. Post name and telephone number of Contractor's local contact person, brief project description and location of the SWP3.
 - a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with the Owner's Representative to conform to requirements of the Construction General Permit.
 - b. If Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 10 TPDES Requirements

construction. Move notice as necessary.

3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction exit area.
4. Post a notice of waste disposal procedures in a readily visible location on site.

3.7 ON-SITE WASTE MATERIAL STORAGE

- A. On-site waste material storage shall be self-contained and shall satisfy appropriate local, state, and federal rules and regulations.
- B. Prepare list of waste material to be stored on-site. Update list as necessary to include up-to-date information. Keep a copy of updated list with the SWP3.
- C. Prepare description of controls to reduce pollutants generated from on-site storage. Include storage practices necessary to minimize exposure of materials to storm water, and spill prevention and response measures consistent with best management practices. Keep a copy of the description with the SWP3.

3.8 NOTICE OF TERMINATION

- A. Submit a NOT to TCEQ and the Engineer within 30 days after:
 1. Final stabilization has been achieved on all portions of the site that are the responsibility of the Contractor; or
 2. Another operator has assumed control over all areas of the site that have not been stabilized; and
 3. All silt fences and other temporary erosion controls have either been removed, scheduled to be removed as defined in the SWP3, or transferred to a new operator if the new operator has sought permit coverage.

End of Section 01 57 10

SECTION 01 57 13 – EROSION AND SEDIMENTATION CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section pertains to the implementation, maintenance inspection, and termination of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other appropriate practices shown on the Storm Water Pollution Prevention Plan (SWPP PLAN), on the plans or required by the Texas Pollutant Discharge Elimination System (TPDES) General Permit TXR150000.
- B. The Contractor is responsible for meeting all local, state and federal regulations regarding erosion control including the applicable provisions of the National Pollution Discharge Elimination System, Phase II, regulations from the Clean Water Act.

1.02 DEFINITIONS

- A. Commencement of Construction Activities: The exposure of soil resulting from activities such as clearing, grading, and excavation activities, as well as other construction related activities (e.g., stock piling of fill material, demolition).
- B. Large Construction Activity: Project that:
 - 1. Disturbs five acres or more, or
 - 2. Disturbs less than five acres but is part of a larger common plan of development that will disturb five acres or more of land.
- C. Small Construction Activity: Project that:
 - 1. Disturbs one or more acres but less than five acres, or
 - 2. Disturbs less than one acre but is part of a larger common plan of development that will ultimately disturb one or more acres but less than five acres.
- D. TPDES Operator:
 - 1. Operator - The person or persons associated with a large or small construction activity that is either a primary or secondary as defined below:
 - a. Primary Operator – the person or persons associated with a large or small construction activity that meets either of the following two criteria:
 - i. The persons have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications;
 - ii. The person or persons have day-to-day operational control of those activities at a construction site that are necessary to ensure compliance with a storm water pollution prevention plan (SWPP PLAN) for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWPP PLAN or comply with other permit conditions).
 - b. Secondary Operator – The person whose operational control is limited to the employment of other operators or to the ability to approve or disapprove changes to plans and specifications. A secondary operator is also defined as a primary operator if there are no other operators at the construction site.

- E. Best Management Practices (BMP's): Physical facilities schedules of activities, prohibition of practices, maintenance procedures, and other management practices, when properly designed, installed, and maintained, will be effective to prevent or reduce the discharge of pollution associated with construction activities. BMP's also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
- F. Block Sodding: Sodding for erosion control and for final stabilization shall consist of providing and planting Bermuda grass, San Augustine grass, or other acceptable sod along or across such areas as are designated on the drawings and in accordance with the specification requirements herein outlined.
- G. Hydromulch Seeding: Seeding, followed by the application of a mulch erosion control blanket shall consist of preparing the ground, sowing of seeds, application of a fertilizer, and stabilization with mulch consisting of a biodegradable fiber along and across such areas as are designated on the plans and in accordance with these specifications
- H. Silt Fence: The reinforced filter fabric barrier consists of geotextile fabric supported by a net reinforced fence stretched across and attached to supporting posts or frame and entrenched. Work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation as designated on the plans and in accordance with these specifications.
- I. Inlet Protection Barriers: The inlet protection barrier consists of a geotextile fabric (filter fabric) supported by a net reinforced fence structure and constructed around a storm drain inlet, catch basin, or culvert. An alternative design of the inlet protection barrier, as approved by the Engineer, consists of fiber rolls placed around a frame, staked in place (or weighted down with clean gravel bags), and constructed around a storm drain inlet, catch basin or culvert. This work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation. As designated on the plans and in accordance with these specifications.
- J. Sediment Basins: A sediment basin is a temporary basin or dam constructed across a waterway or excavated location to intercept sediment-laden runoff and to trap and retain the sediment. A sediment basin is usually installed at points of discharge from drainage areas greater than 5 acres. Work shall be performed during construction operations and prior to final stabilization to control erosion and sedimentation as designated on the plans and in accordance with these specifications.
- K. Stabilized Construction Access: This work shall consist of the installation of temporary erosion protection and sediment control stabilized construction access - type I, rock, utilized during construction operations and prior to final stabilization, in accordance with these specifications and construction drawings.
- L. Rock Filter Dams: Rock filter dams are temporary berms constructed of stone to intercept and slow storm water runoff to retain sediment on the construction site.
 - 1. Depending upon the type of rock filter dam specified in the construction plans as Type 1, 2, 3, or 4, the aggregate fill may be unwrapped, wrapped in twisted

hexagonal wire mesh, or confined in a gabion wire basket. Applications of Rock Filter Dams are as follows:

- a. Type 1 dams may be used at toe of slopes, around inlets, in small ditches, and at dike or swale outlets. Type 1 dams are recommended for erosion and sediment control from a drainage area of 5 acres or less.
- b. Type 2 dams may be used in ditches and at dike or swale outlets.
- c. Type 3 dams may be used in stream flow.
- d. Type 4 sack gabions may be used in ditches and smaller channels to form an erosion and sediment control dam

1.03 REGULATORY REQUIREMENTS

- A. Contractor shall comply with all current, applicable codes and regulations.
- B. Contractor shall comply with all Standard Specifications and Details of Authorities having Jurisdiction for work in the right-of-way or easements.
- C. Prior to commencement of work, the Contractor shall be responsible for obtaining, at the contractors own expense, all construction permits necessary to complete the project according to the plans and specifications.

1.04 SUBMITTALS

- A. Submit a copy of the Storm Water Pollution Prevention Plan (SWPP Plan).
- B. Submit a copy of the Notice of Intent (NOI).
- C. Submit a copy of the Notice of Termination (NOT).
- D. Submit manufacturer's literature for product specifications and installation instructions.
- E. Submit manufacturer's catalog sheets and other product data on geotextile or filter fabrics, outlet pipe, perforated riser and connectors.
- F. Submit proposed methods, equipment, materials, and sequence of operations for storm-water pollution prevention structures.
- G. Submit shop drawings for inlet baskets.

1.05 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

PART 2 – PRODUCTS

2.01 SUSTAINABLE MATERIALS

- A. Contractor shall strive to utilize sustainable materials, which include rapidly renewable materials, regional materials, regionally manufactured materials, regionally extracted materials, recycled contents.

2.02 GRASS

- A. Materials for erosion control seeding shall conform to the requirements of 32 92 13 – Hydromulch Seeding.
- B. Materials for erosion control seeding shall conform to the requirements of 32 92 00 – Turf and Grasses.

2.03 BANK SAND BACKFILL

- A. Durable bank run sand classified as SP, SW, or SM by Unified Soil Classification System (ASTM D 2487) meeting following requirements:
 - 1. Less than 15 percent passing number 200 sieve when tested in accordance with ASTM D 1140. Amount of clay lumps or balls may not exceed 2 percent.
 - 2. Material passing number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318: PI not exceeding 7.

2.04 WATER

- A. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter or other substances injurious to the finished product.
- B. Water sources other than the local municipal domestic water supply must be approved by the Owner's Representative.
- C. If onsite reclaimed water sources are used, tanks and appurtenances must be clearly marked with the words "non-potable" water.

2.05 STABILIZED CONSTRUCTION ACCESS

- A. Provide crushed aggregate for long- and short-term construction exits. Furnish aggregates that are clean, hard, durable, and free from adherent coatings such as salt, alkali, dirt, clay, loam, shale, soft or flaky materials, and organic and injurious matter. Use 4 to 8-inches aggregate for Type 1. Use 2 to 4-inches aggregate for Type 3.

2.06 SILT FENCE

- A. Woven or nonwoven geotextile filter fabric made of polypropylene, polyethylene, ethylene, or polyamide material, in continuous rolls of longest practical length.
- B. Grab Strength: 100 psi in any principal direction (ASTM D-4632), CBR puncture strength >200 psi (ASTM D-3786), and equivalent opening size between 50 and 140.

- C. Furnish ultraviolet inhibitors and stabilizers for minimum 6 months of expected usable construction life at temperature range of 0 degrees F to 120 degrees F.
- D. Provide net reinforcement of at least 12.5 gauge (SWG) galvanized welded wire mesh, with a maximum opening size of 2 × 4 in., at least 24 in. wide, unless otherwise shown on the plans.
- E. TenCate Geosynthetics, Contech Engineered Solutions, or equivalent.

2.07 INLET PROTECTION BARRIERS

- A. Geotextile shall be per the requirements of paragraph 2.6 of this section.
- B. Provide net reinforcement of at least 12.5 gauge (SWG) galvanized welded wire mesh, with a maximum opening size of 2 × 4 in., at least 24 in. wide, unless otherwise shown on the plans.
- C. Barrier Stakes: Nominal 2 by 2 inch moisture-resistant treated wood or steel posts (min. of 1.25 lbs. per linear foot and Brinell Hardness greater than 140) with safety caps on top; length as required for minimum 12 inch bury and full height of filter fabric.

2.08 DROP INLET BASKET

- A. Provide steel frame members in accordance with ASTM A36.
- B. Construct top frame of basket with two short sides of 2 inch by 2 inch and single long side of 1 inch by 1 inch, 1/8 inch angle iron. Construct basket hangers of 2 inch by 1/4 inch iron bars. Construct bottom frame of 1 inch by 1/4 inch iron bar or 1/4 inch plate with center 3 inches removed. Use minimum 1/4 inch diameter iron rods or equivalent for sides of inlet basket.
- C. Weld a minimum of 14 rods in place between top frame/basket hanger and bottom frame. Exact dimensions for top frame and insert basket will be determined based on dimensions of type of inlet being protected.

2.09 SANDBAGS

- A. Provide woven material made of polypropylene, polyethylene, or polyamide material.
 - 1. Minimum unit weight of four ounces per square yard.
 - 2. Minimum grab strength of 100 lbs in any principal direction (ASTM D4632).
 - 3. Mullen burst strength exceeding 300 lbs (ASTM D4833).
 - 4. Ultraviolet stability exceeding 70 percent. After 500 hours of exposure (ASTM 4355).
 - 5. Size: Length: 18 to 24 inches. Width: 12 to 18 inches. Thickness: 6 to 8 inches. Weight: Approximately 40 to 50 pounds not to exceed 75 pounds.

2.10 BAGGED GRAVEL BARRIER

- A. Provide a bagged gravel barrier.
 - 1. Minimum unit weight of four ounces per square yard.

2. Minimum grab strength of 100 lbs in any principal direction (ASTM D4632).
3. Mullen burst strength exceeding 300 lbs (ASTM D4833).
4. Ultraviolet stability exceeding 70 percent. After 500 hours of exposure (ASTM 4355).
5. Size: Length:18 to 24 inches. Width: 12 to 18 inches. Thickness: 6 to 8 inches. Weight: Approximately 40 to 50 pounds not to exceed 75 pounds.

2.11 ROCK FILTER DAM

- A. Materials. Geotextile fabric shall consist of a woven monofilament or spunbond nonwoven fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins. Geotextile fabric shall equal or exceed the following average roll values or as directed by the Engineer:
 1. Minimum average roll value.
 - a. Elongation ³ 50 percent.
 - b. Grab Strength – 200 pounds.
 - c. Puncture Strength – 75 pounds.
 - d. UV Stability (retained strength) – 50 percent after 500 hours of exposure.
 2. Maximum average roll value.
 - a. Apparent Opening Size (AOS) – 0.6 mm/#30 US sieve.
- B. Geotextile fabric shall be resistant to commonly encountered soil chemicals, mildew, rot, insects, and deterioration resulting from exposure to sunlight or heat. Geotextile fabric shall provide an expected useable life comparable to the anticipated construction period.
- C. Aggregate for the rock filter dams shall consist of crushed stone. Aggregate particles shall be composed of clean, hard, durable materials free from adherent coatings, salt, alkali, dirt, clay, loam, shale, soft or flaky materials or organic and injurious matter. Aggregate shall be cubic or rounded form, not elongated, flat, shapes. Spalls, fragments, and chips shall not exceed 5 percent by weight. Crushed concrete may be substituted for the crushed stone. Aggregate size shall depend upon the type of rock filter dam specified in the construction plans. Aggregate size based on type of rock filter dam is as follows:
 1. Type 1:
 - a. Used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets for a drainage area of 5 acres or less.
 - b. 3 inches to 5 inches, open-graded.
 2. Type 2:
 - a. Used in ditches and at dike or swale outlets.
 - b. 3 inches to 5 inches, open-graded.
 3. Type 3:
 - a. Used in stream flow.
 - b. 4 inches to 8 inches, open-graded.
 4. Type 4:
 - a. Sack gabions may be used in ditches and smaller channels to form an erosion and sediment control dam.
 - b. 3 inches to 5 inches, open-graded.
- D. Mesh is required for reinforced type rock filter dams. Mesh shall be 20 gauge galvanized double twisted hexagonal wire mesh with 1-inch diameter hexagonal

openings. Mesh wire shall be zinc coated prior to being double twisted. Reinforcing spiral binders, lacing wire, and stiffeners shall be made of wire having the same coating material and same wire size as the wire mesh. Gabion wire baskets shall equal or exceed the requirements of the wire mesh.

PART 3 – EXECUTION

3.01 PREPERATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.
- C. Plan Work to minimize the time areas are to be exposed without vegetative cover.
- D. Prepare a SWPP Plan following the requirements of the Construction General Permit and the requirements of the local MS4. If conflicts exist between the Construction General Permit and the requirements of the MS4, the more stringent requirements will apply.
 - 1. Update or revise the SWPPP as needed during the construction following the requirements of the Construction General Permit.
 - 2. Submit the SWPPP and any updates or revisions to the Owner's Representative for review and address comments prior to commencing, or continuing, construction activities.
- E. Notice of Intent for Large Construction Activity
 - 1. Fill out, sign, and date TCEQ Notice of Intent (NOI) form for Storm Water Discharges Associated with Construction Activity under the TPDES Construction General Permit (TXR 150000) for the Contractor and Owner.
 - 2. Transmit the signed Contractor's and Owner's copy of the NOI, along the required fees to the TCEQ. Provide a copy of the documents to the Owner's Representative.
 - 3. Submission of the Notice of Intent form by the Contractor and Owner is required a minimum of seven days before Commencement of Construction Activities.
- F. Construction Site Notice for Small Construction Activity
 - 1. Fill out, sign, and date the Construction Site Notice, contained in the TPDES General Permit TXR 150000.
 - 2. Transmit the signed Construction Site Notice to Owner's Representative at least seven days prior to Commencement of Construction Activity.
- G. Certification Requirements
 - 1. Complete the Large Construction Site "Primary Operator" Notice.
 - 2. Contractor shall complete the Large Construction Site "Secondary Operator" Notice and provide it to the Owner and Subcontractor's for signature.
 - 3. Submit properly completed certification forms to the Owner's Representative for review before beginning construction operations.
 - 4. Conduct inspections in accordance with TCEQ requirements. Use the EPA NPDES Construction Inspection Form to record maintenance inspections and repairs.

- H. Post the following notices from effective date of the SWPP Plan until date of final site stabilization as defined in the Construction General Permit:
 - 1. Post the TPDES permit number for Large Construction Activity, with a signed TCEQ Construction Site Notice for large or Small Construction Activity. Signed copies of the Contractor's and Owner's NOI, as applicable, must also be posted.
 - 2. Post notices near the main entrance of the construction site in a prominent place where it is safely and readily available for viewing by General Public, Local, State, and Federal Authorities. Post name and telephone number of Contractor's local contact person, brief project description and location of the SWPP PLAN.
 - a. If posting near a main entrance is not feasible due to safety concerns, coordinate posting of notice with The Owner's Representative to conform to requirements of the Construction General Permit.
 - b. If Project is a linear construction project (e.g.: road, utilities, etc.), post notice in a publicly accessible location near active construction. Move notice as necessary.
 - 3. Post a notice to equipment and vehicles operators, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post at each stabilized construction access area.
 - 4. Post a notice of waste disposal procedures in a readily visible location on site.
- I. Keep a copy of this document and the SWPP Plan in a readily accessible location at the construction site from Commencement of Construction Activity until submission of the Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity under TPDES Construction General Permit (TXR 150000). Contractors with day-to-day operational control over SWPP Plan implementation shall have a copy of the SWPP PLAN available at a central location, on-site, for the use of all operators and those identified as having responsibilities under the SWPP Plan. Upon submission of the NOT, submit all required forms and a copy of the SWPP Plan with all revisions to the Owner's Representative.

3.02 GENERAL

- A. Use all means necessary to control dust on or near the site resulting from the performance of the Work. Thoroughly moisten all surfaces to prevent dust being a nuisance to the public, adjacent uses, and concurrent work on site. Moisture level during compaction operations shall not exceed that amount as specified by Geotechnical Engineer.
- B. Install erosion control systems at the site's boundary at locations where stormwater runoff will leave the site prior to starting any clearing, stripping, or earthwork operations.
- C. Properly dispose of solid waste, paints, solvents, cleaning compounds, etc.
- D. Store construction materials in designated areas away from drainageways and low areas.
- E. Construct containment berms and utilize drip pans at fuel and liquid storage tanks and containers.

3.03 INSTALLATION OF EROSION CONTROL DEVICES

- A. Install erosion control devices to protect adjacent and downstream properties from damage and pollution resulting from erosion caused by the work of this Contract. Implement erosion control measures indicated on drawings and additional erosion control measures necessary to prevent damage to adjacent and downstream properties.
- B. Install silt fence located along perimeter of site or grading limits immediately following site clearing operations specified under Division 31 Section 31 11 00 – Clearing and Grubbing.
 - 1. Install silt fence fabric from a continuous roll for the length of the silt fence whenever possible to minimize the number of joints. Create joints in fabric by securely fastening fabric at the support post with overlap extending to the next post.
 - 2. Drive support post into ground not less than 18 inches.
 - 3. Excavate a 4-inch wide by 4-inch deep trench on up-slope side of silt fence.
 - a. Line trench with silt fence fabric material.
 - b. Backfill trench with soil or gravel.
- C. Install inlet protection barriers at all inlets.
- D. Stabilized Construction Access
 - 1. Provide stabilized construction roads and access at construction, staging, parking, storage, and disposal areas to keep street clean of mud carried by construction vehicles and equipment. Construct erosion and sediment controls in accordance with Drawings, Specification and any requirements of the authority having jurisdiction.
 - 2. Place the exit over a foundation course, if necessary. Grade the foundation course or compacted subgrade to direct runoff from the construction exits to a sediment trap.
 - 3. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as required.
 - 4. Construct to a depth of at least 8 in. using crushed aggregate as shown on the plans or as directed.

3.04 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- C. Stockpile Topsoil may not exceed 6 feet in height.

3.05 FIELD QUALITY CONTROL

- A. Testing shall be the responsibility of the Owner and costs of initial testing shall be paid by Owner. Cost of all subsequent testing necessary due to non-compliance with specifications shall be paid by Contractor.

B. Density Test:

1. Frequency and scope of testing shall be established by Geotechnical Engineer, and as required by local jurisdictional authority. If Geotechnical Engineer has not established a frequency of testing in the Geotechnical Report, testing shall be at every 100 linear foot of trench at a minimum of one per lift and a minimum of one per day.
2. Tests shall be performed in accordance with the referenced Standards.
3. Laboratory tests for moisture density relations shall be determined in accordance with ASTM D 1557. A minimum of one test shall be performed for each major soils type. In addition, sufficient number of retests or check points shall be performed to evaluate accuracy of maximum density values being used.
4. Field in-place density shall be determined in accordance with ASTM Test Methods D 1556 or D 2922, and the moisture-density relations shall be determined in accordance with ASTM Test Method D 1557.
5. Reopen improperly compacted trenches to depth directed, then refill and compact to the specified density at no additional cost to Owner

3.06 DRAINAGE CONTROLS

- A. Provide all necessary temporary apparatus, pumps, curbs or ditches as required to divert or convey water from any source away from the Work. Do not allow water from any source to accumulate within or damage trenches.

END OF SECTION 31 22 13

DIVISION 1 – GENERAL REQUIREMENTS
Section 01 57 19 Control of Ground Surface Water

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Dewatering, depressurizing, draining, and maintaining trenches, shaft excavations, structural excavations and foundation beds in stable condition, and controlling ground water conditions for tunnel excavations.
- B. Protecting work against surface runoff and rising floodwaters.
- C. Trapping suspended sediment in the discharge from the surface and ground water control systems.

1.2 SUSTAINABLE DESIGN (LEED) REQUIREMENTS

- A. New School Projects shall be LEED Certified Projects.

PART 2 MEASUREMENTS AND PAYMENT

2.1 UNIT PRICES

- A. Measurement for control of ground water, if included in Bid Form, will be on either a lump sum basis or a linear foot basis for continuous installations of well points, eductor wells, or deep wells.
- B. If not included in Bid Form, include the cost to control ground water in unit price for work requiring such controls.
- C. No separate payment will be made for control of surface water. Include cost to control surface water in unit price for work requiring controls.
- D. Follow Division 1 for unit price procedures.

2.2 REFERENCES

- A. ASTM D 698 - Standard Test Methods for Laboratory Compaction of Soils Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³).
- B. Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).
- C. Storm Water Management Handbook for Construction Activities prepared by Cities having jurisdiction authority.

2.3 DEFINITIONS

- A. Ground water control system: system used to dewater and depressurize water-bearing soil layers.
 - 1. Dewatering: lowering the water table and intercepting seepage that would otherwise emerge from slopes or bottoms of excavations, or into tunnels and shafts; and disposing of removed water. Intent of dewatering is to increase stability of tunnel excavations and excavated slopes, prevent dislocation of material from slopes or bottoms of excavations, reduce lateral loads on sheeting and bracing, improve excavating and hauling characteristics of excavated material, prevent failure or heaving of bottom of excavations, and to provide suitable conditions for placement of backfill materials and construction of structures and other installations.
 - 2. Depressurization: includes reduction in piezometric pressure within strata not controlled by dewatering alone, necessary to prevent failure or heaving of excavation bottom or instability of tunnel excavations.
- B. Excavation drainage: includes keeping excavations free of surface and seepage water.

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- C. Surface drainage: includes use of temporary drainage ditches and dikes and installation of temporary culverts and sump pumps with discharge lines necessary to protect Work from any source of surface water.
- D. Monitoring facilities for ground water control system: includes piezometers, monitoring wells and flow meters for observing and recording flow rates.

2.4 PERFORMANCE REQUIREMENTS

- A. Conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems. Submit proposed method and spacing of readings for review prior to obtaining water level readings.
- B. Design ground water control system, compatible with requirements of Federal Regulations 29 CFR Part 1926 and Division 2 to produce following results:
 - 1. Effectively reduce hydrostatic pressure affecting:
 - a. Excavations.
 - b. Tunnel excavation, face stability or seepage into tunnels.
 - 2. Develop substantially dry and stable subgrade for subsequent construction operations.
 - 3. Preclude damage to adjacent properties, buildings, structures, utilities, installed facilities and other work.
 - 4. Prevent loss of fines, seepage, boils, quick condition, or softening of foundation strata.
 - 5. Maintain stability of sides and bottom of excavations.
- C. Provide ground water control systems that include single-stage or multiple-stage well point systems, eductor and ejector-type systems, deep wells, or combinations of these equipment types.
- D. Provide drainage of seepage water and surface water, as well as water from other sources entering excavation. Excavation drainage may include placement of drainage materials, crushed stone and filter fabric, together with sump pumping.
- E. Provide ditches, berms, pumps and other methods necessary to divert and drain surface water from excavation and other work areas.
- F. Locate ground water control and drainage systems so as not to interfere with utilities, construction operations, adjacent properties, or adjacent water wells.
- G. Assume sole responsibility for ground water control systems and for any loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations. Modify ground water control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, adjacent water wells, or potentially contaminated areas. Repair damage caused by ground water control systems or resulting from failure of system to protect property as required.
- H. Install an adequate number of piezometers installed at proper locations and depths, necessary to provide meaningful observations of conditions affecting excavation, adjacent structures and water wells.
- I. Install environmental monitoring wells at proper locations and depths necessary to provide adequate observations of hydrostatic conditions and

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possible contaminant transport from contamination sources into work area or ground water control system.

2.5 SUBMITTALS

- A. Conform to requirements of Division 1.
- B. Submit Ground Water and Surface Water Control Plan for review by Owner's Representative prior to start of excavation work. Include the following:
 - 1. Results of subsurface investigations and description of extent and characteristics of water bearing layers subject to ground water control.
 - 2. Names of equipment Suppliers and installation Subcontractors.
 - 3. Description of proposed ground water control systems indicating arrangement, location, depth and capacities of system components, installation details and criteria and operation and maintenance procedures.
 - 4. Description of proposed monitoring facilities indicating depths and locations of piezometers and monitoring wells, monitoring installation details and criteria, type of equipment and instrumentation with pertinent data and characteristics.
 - 5. Description of proposed filters including types, sizes, capacities and manufacturer's application recommendations.
 - 6. Design calculations demonstrating adequacy of proposed systems for intended applications. Define potential area of influence of ground water control operation near contaminated areas.
 - 7. Operating requirements, including piezometric control elevations for dewatering and depressurization.
 - 8. Excavation drainage methods including typical drainage layers, sump pump application and other means.
 - 9. Surface water control and drainage installations.
 - 10. Proposed methods and locations for disposing of removed water.
- C. Submit following records upon completion of initial installation:
 - 1. Installation and development reports for well points, eductors, and deep wells.
 - 2. Installation reports and baseline readings for piezometers and monitoring wells.
 - 3. Baseline analytical test data of water from monitoring wells.
 - 4. Initial flow rates.
- D. Submit the following records weekly during control of ground and surface water operations:
 - 1. Records of flow rates and piezometric elevations obtained during monitoring of dewatering and depressurization. Refer to Paragraph 3.02, Requirements for Eductor, Well Points, or Deep Wells.
 - 2. Maintenance records for ground water control installations, piezometers and monitoring wells.

2.6 ENVIRONMENTAL REQUIREMENTS

- A. Comply with requirements of agencies having jurisdiction.

DIVISION 1 – GENERAL REQUIREMENTS
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- B. Comply with Texas Commission on Environmental Quality regulations and Texas Water Well Drillers Association for development, drilling, and abandonment of wells used in dewatering system.
- C. Obtain necessary permits from agencies with jurisdiction over use of groundwater and matters affecting well installation, water discharge, and use of existing storm drains and natural water sources. Since review and permitting process may be lengthy, take early action to obtain required approvals.
- D. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites.

PART 3 PRODUCTS

3.1 EQUIPMENT AND MATERIALS

- A. Select equipment and materials necessary to achieve desired results for dewatering. Selected equipment and materials are subject to review by Owner's Representative through submittals required in Paragraph 1.06, Submittals.
- B. Use experienced contractors, regularly engaged in ground water control system design, installation, and operation, to furnish and install and operate eductors, well points, or deep wells, when needed.
- C. Maintain equipment in good repair and operating condition.
- D. Keep sufficient standby equipment and materials available to ensure continuous operation, where required.
- E. Portable Sediment Tank System: Standard 55-gallon steel or plastic drums, free of hazardous material contamination.
 - 1. Shop or field fabricate tanks in series with main inlet pipe, inter-tank pipes and discharge pipes, using quantities sufficient to collect sediments from discharge water.

PART 4 EXECUTION

4.1 GROUND WATER CONTROL

- A. Perform necessary subsurface investigation to identify water bearing layers, piezometric pressures and soil parameters for design and installation of ground water control systems. Perform pump tests, if necessary to determine draw down characteristics. Present results in the Ground Water and Surface Water Control Plan submittal.
- B. Provide labor, material, equipment, techniques and methods to lower, control and handle ground water in manner compatible with construction methods and site conditions. Monitor effectiveness of installed system and its effect on adjacent property.
- C. Install, operate, and maintain ground water control systems in accordance with the Ground Water and Surface Water Control Plan. Notify Owner's Representative in writing of changes made to accommodate field conditions and changes to Work. Provide revised drawings and calculations with notification.
- D. Provide continuous system operation, including nights, weekends, and holidays. Arrange appropriate backup if electrical power is primary energy source for dewatering system.

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- E. Monitor operations to verify systems lower ground water piezometric levels at rate required to maintain dry excavation resulting in stable subgrade for subsequent construction operations.
 - F. Depressurize zones where hydrostatic pressures in confined water bearing layers exist below excavations to eliminate risk of uplift or other instability of excavation or installed works. Define allowable piezometric elevations in the Ground Water and Surface Water Control Plan.
 - G. Removal of ground water control installations.
 - 1. Remove pumping system components and piping when ground water control is no longer required.
 - 2. Remove piezometers, including piezometers installed during design phase investigations and left for Contractor's use, upon completion of testing, as required in accordance with Part 3 of applicable specification.
 - 3. Remove monitoring wells when directed by Owner's Representative.
 - 4. Grout abandoned well and piezometer holes. Fill piping that is not removed with cement-bentonite grout or cement-sand grout.
 - H. During backfilling, maintain water level a minimum of 5 feet below prevailing level of backfill. Do not allow the water level to cause uplift pressures in excess of 80 percent of downward pressure produced by weight of structure or backfill in place. Do not allow water levels to rise into cement-stabilized sand until at least 48 hour after placement.
 - I. Provide uniform pipe diameter for each pipe drain run constructed for dewatering. Remove pipe drains when no longer required. If pipe removal is impractical, grout connections at 50-foot intervals and fill pipe with cement-bentonite grout or cement-sand grout after removal from service.
 - J. The extent of ground water control for structures with permanent perforated underground drainage systems may be reduced, for units designed to withstand hydrostatic uplift pressure. Provide a means to drain affected portions of underground systems, including standby equipment. Maintain drainage systems during construction operations.
 - K. Remove systems upon completion of construction or when dewatering and control of surface or ground water is no longer required.
 - L. Compact backfill to not less than 95 percent of maximum dry density in accordance with ASTM D 698.
 - M. Foundation Slab: Maintain saturation line at least 3 feet below lowest elevations where concrete is to be placed. Drain foundations in areas where concrete is to be placed before placing reinforcing steel. Keep free from water for 3 days after concrete is placed.
- 4.2 REQUIREMENTS FOR EDUCTOR, WELL POINTS, OR DEEP WELLS
- A. For above ground piping in ground water control system, include a 12-inch minimum length of clear, transparent piping between each eductor well or well point and discharge header to allow visual monitoring of discharge from each installation.
 - B. Install sufficient piezometers or monitoring wells to show that trench or shaft excavations in water bearing materials are pre-drained prior to excavation. Provide separate piezometers for monitoring of dewatering

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- and for monitoring of depressurization. Install piezometers and monitoring wells for tunneling as appropriate for selected method of work.
 - C. Install piezometers or monitoring wells at least one week in advance of the start of associated excavation.
 - D. Dewatering may be omitted for portions of under drains or other excavations, where auger borings and piezometers or monitoring wells show that soil is pre-drained by existing systems and that ground water control plan criteria are satisfied.
 - E. Replace installations that produce noticeable amounts of sediments after development.
 - F. Provide additional ground water control installations, or change method of control if, ground water control plan does not provide satisfactory results based on performance criteria defined by plan and by specifications. Submit revised plan according to Paragraph 1.6B.
- 4.3 SEDIMENT TRAPS
- A. Install sediment tank as shown on approved plan if required.
 - B. Inspect daily and clean out tank when one-third of sediment tank is filled with sediment.
- 4.4 SEDIMENT SUMP PIT
- A. Install sediment sump pits as shown on approved plan if required.
 - B. Construct standpipe by perforating 12 inch to 24-inch diameter corrugated metal or PVC pipe.
 - C. Extend standpipe 12 inches to 18 inches above lip of pit.
 - D. Convey discharge of water pumped from standpipe to sediment trapping device.
 - E. Fill sites of sump pits, compact to density of surrounding soil and stabilize surface when construction is complete.
- 4.5 EXCAVATION DRAINAGE
- A. Use excavation drainage methods if well-drained conditions can be achieved. Excavation drainage may consist of layers of crushed stone and filter fabric, and sump pumping, in combination with sufficient ground water control wells to maintain stable excavation and backfill conditions.
- 4.6 MAINTENANCE AND OBSERVATION
- A. Conduct daily maintenance and observation of piezometers or monitoring wells while ground water control installations or excavation drainage is operating at the site, or water is seeping into tunnels, and maintain systems in good operating condition.
 - B. Replace damaged and destroyed piezometers or monitoring wells with new piezometers or wells as necessary to meet observation schedules.
 - C. Cut off piezometers or monitoring wells in excavation areas where piping is exposed, only as necessary to perform observation as excavation proceeds. Continue to maintain and make specified observations.
 - D. Remove and grout piezometers inside or outside of excavation area when ground water control operations are complete. Remove and grout monitoring wells when directed by Owner's Representative.
- 4.7 MONITORING AND RECORDING
- A. Monitor and record average flow rate of operation for each deep well, or for each wellpoint or eductor header used in dewatering system. Also,

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monitor and record water level and ground water recovery. Record observations daily until steady conditions are achieved and twice weekly thereafter.

- B. Observe and record elevation of water level daily as long as ground water control system is in operation, and weekly thereafter until Work is completed or piezometers or wells are removed, except when Owner's Representative determines more frequent monitoring and recording are required. Comply with Owner's Representative's direction for increased monitoring and recording and take measures necessary to ensure effective dewatering for intended purpose.

4.8 SURFACE WATER CONTROL

- A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other approved means. Requirement includes temporary works required to protect adjoining properties from surface drainage caused by construction operations.
- B. Divert surface water and seepage water into sumps and pump it into drainage channels or storm drains, when approved by agencies having jurisdiction. Provide settling basins when required by agencies.

End of Section 01 57 19

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.

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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.

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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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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

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- 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

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

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

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

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01 61 16 – VOLATILE ORGANIC COMPOUND CONTENT RESTRICTIONS

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.

DIVISION 1 – GENERAL REQUIREMENTS
SECTION 01 61 16 – VOLATILE ORGANIC COMPOUND CONTENT RESTRICTIONS

- 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

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

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 77 00 Closeout Procedures

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion.
2. Final Completion.
3. Warranties.
4. Final cleaning.

B. Related Sections:

1. Division 01 Section "Execution" for progress cleaning of Project site.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.
6. Forms located at the end of this Section 01 77 00:
 - a. GC Closeout Checklist
 - b. Conditional Waiver and Release on Final Payment
 - c. Unconditional Waiver and Release on Final Payment
 - d. Warranty Form
 - e. Asbestos Free Letter Form
 - f. Lead Free Letter Form
 - g. PCB Free Letter Form

1.3 SUBSTANTIAL COMPLETION

A. Substantial Completion Certificate:

1. Before requesting inspection for determining date of Substantial Completion, complete the requirements listed on the GC Closeout Checklist. Establish the date when the work is complete.
2. Prepare a list of items to be completed and corrected (punch list), the value of item on the list, and reasons why the Work is not complete.
3. Ensure required parties have accepted the work and executed the certificate.
4. Advise the Owner of pending insurance changeover requirement.
5. Grant the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits and similar releases.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 77 00 Closeout Procedures

-
6. Complete startup, commissioning, testing, manufacturer requirements, and corrections of all systems.
 7. Establish the start date for the warranties.
 8. Establish the completion of the contract time in order to determine if liquidated damages apply.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, the items listed in 1.3 of this section must be complete. The Contractor must also complete the items listed in the attached “General Contractor Closeout Checklist” at the end of this section.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Contractor.
 - d. Page number.
 4. Submit list of incomplete items in the following format:
 - a. PDF electronic file.
 - b. Projects using the owner’s designated software will require the punch list information to be input on an excel spread sheet. The example of the sheet is at the end of this specification section.

1.6 WARRANTIES

- A. Submittal Time: All warranties shall commence on the date of substantial completion unless noted otherwise. Exceptions will have to be approved by architect and owner’s representative and notes made on the AIA substantial completion document.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or

DIVISION 1 – GENERAL REQUIREMENTS

Section 01 77 00 Closeout Procedures

installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document. Coordinate paragraph below if Division 01 Section "Operation and Maintenance Data" is used.

Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Sweep concrete floors broom clean in unoccupied spaces.
 - g. Vacuum carpet and similar soft surfaces, removing debris and

DIVISION 1 – GENERAL REQUIREMENTS

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- excess nap; shampoo if visible soil or stains remain.
 - h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - i. Remove labels that are not permanent.
 - j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
 - k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

End of Section 01 77 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.
3 EVIDENCE OF PAYMENT OF DEBTS AND CLAIMS				

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks
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)
c.	HVAC Controls drawings	GC		
d.	Fire Sprinkler System drawings	GC		Need AHJ approved documents.

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks
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.

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)

(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

(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-1 - National drinking water regulations.

Architect's or Project Engineer's Stamp

Signature Date

(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

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

- 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

- 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

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

-
- 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 02 41 19 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for use of premises, and phasing and Owner-occupancy requirements.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
 - 3. Division 01 Section "Cutting and Patching" for cutting and patching procedures.

1.02 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner as indicated in the drawings.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, or removed and salvaged.

1.03 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 - 6. Means of protection for items to remain and items in path of waste removal from building.
- B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- C. Predemolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with "Instructions to Proposers" for documentation of existing conditions. Submit before Work begins.
- D. Landfill Records: Provide if requested by Owner, records indicating receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.04 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.05 PROJECT CONDITIONS

- A. Owner will continue to occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 01 Section "Summary."
 - 2. Provide, erect and maintain temporary barriers as required.
 - 3. Erect and maintain waterproof closures for exterior openings.
- B. Conditions existing at time of inspection for proposal purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove items as indicated on the drawings. The Owner will have first right of refusal on all equipment, parts, materials, etc. being demoed by the contractor.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the work.

- F. Hazardous Materials: Present in existing buildings to be selectively demolished. Reports on the presence of hazardous materials are appended to this addendum for review and use. Examine reports to become aware of locations where hazardous materials are present. See Section 01 23 00 - Alternates for description of alternate to provide asbestos abatement prior to selective demolition.
- 1. If materials suspected of containing hazardous materials are encountered, do not disturb: immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.
 - 2. Do not disable or disrupt building system (fire, life safety, mechanical, electrical, plumbing, etc.) without 3 days prior written notice to and authorization from Owner.

1.06 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or preconstruction videotapes.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.03 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."

- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- 3.04 SELECTIVE DEMOLITION, GENERAL
 - A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Provide portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."
 - B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
- 3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
 - A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
 - B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
 - C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - D. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.
- 3.06 DISPOSAL OF DEMOLISHED MATERIALS
 - A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - B. Burning: Do not burn demolished materials.
 - C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
- 3.07 CLEANING
 - A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

SECTION 03 30 53 – MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.
 - 2. Slabs-on-grade at interior slab trench openings
 - 3. Exterior concrete paving: drives, sidewalks, curbs
- B. SUBMITTALS
 - 1. Product Data: For each type of product indicated.
 - 2. Design Mixtures: For each concrete mixture.

1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Comply with ACI 301, "Specification for Structural Concrete."
- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.01 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301.
 - 1. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
 - 2. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
 - 3. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I.
- B. Normal-Weight Aggregate: ASTM C 33, graded, 1-1/2-inch nominal maximum aggregate size.
- C. Water: ASTM C 94/C 94M; potable.

2.04 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.

2.05 RELATED MATERIALS

- A. Vapor Retarder: ASTM E 1745, underslab vapor retarder, Class A, maximum water vapor permeance of 0.024 perms, 15 mil minimum sheet thickness in accordance with ACI 302.1R-96, . Seal with manufacturer's recommended adhesive or pressure sensitive joint tape.
- B. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

2.06 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.07 CONCRETE MIXTURES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of floor slabs to receive troweled finishes to exceed 3 percent.

2.08 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.02 SUBGRADE

- A. Interior slabs: Compacted subgrade in accordance with Division 31 Section "Building Subgrade Preparation".
- B. Exterior walks and paving: Compact subgrade to 95 percent per ASTM D698.

3.03 VAPOR RETARDERS

- A. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended adhesive or joint tape.

3.04 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.05 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness.
- C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.06 CONCRETE PLACEMENT

- A. Comply with ACI 301 for measuring, batching, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

3.07 FINISHING FORMED SURFACES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
 - 1. Apply to concrete surfaces exposed to public view,.
- B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.08 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - 1. Do not further disturb surfaces before starting finishing operations.

3.07 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
 - 1. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.
 - E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
 - F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- 3.08 CONCRETE PROTECTING AND CURING
- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
 - B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 - C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
 - D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- 3.09 FIELD QUALITY CONTROL
- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.
 - B. Tests: Perform according to ACI 301.
- 3.10 REPAIRS
- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03 30 53

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel.
 - 2. Miscellaneous Accessories.
- B. Related Sections include the following:
 - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.

1.02 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges,"

1.03 COORDINATION

- A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.04 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer registered in the State of Texas, to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use LRFD; data are given at factored-load level.
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: Braced frame.

1.05 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
 - 5. For structural-steel connections, the structural-steel fabricator shall include, on request, structural analysis data prepared by the qualified professional engineer registered in the state of Texas responsible for their preparation
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint [whether prequalified or qualified by testing], including the following:
 - 1. Power source (constant current or constant voltage).
 - 2. Electrode manufacturer and trade name, for demand critical welds.
- D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Qualification Data: For qualified Installer, fabricator, and professional engineer.
- E. Mill test reports for structural steel, including chemical and physical properties.
- F. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shop primers.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: The qualified structural steel erector shall have not less than 3 years of successful experience in the erection of structural steel of a similar nature to this project.

- B. Fabricator Qualifications: The qualified structural steel fabricator shall have not less than 5 years experience in the fabrication of structural steel similar to this project.
 - C. Professional Engineer: A professional engineer who is legally authorized to practice in the State of Texas and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.
 - D. Shop-Painting Applicators: Qualified according to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
 - E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel."
 - F. Comply with applicable provisions of the following specifications and documents:
 1. AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."
 2. AISC 360 "Load and Resistance Factor Design Specification for Structural Steel Buildings."
 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
 - B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 1. Select and complete connections using schematic details indicated and AISC 360.
 2. Use Load and Resistance Factor Design or Allowable Stress Design
- B. Moment Connections: Type FR, fully restrained.
- C. Construction: Moment frame, Braced frame.

2.02 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M or ASTM A 572/A 572M, Grade 50 (345), if required by calculations.
- D. Welding Electrodes: Comply with AWS requirements.

2.03 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
- B. Threaded Rods: F1554 Grade 55.
 1. Nuts: ASTM A 563 (ASTM A 563M) heavy hex carbon steel.
 2. Washers: ASTM A 36/A 36M carbon steel.
 3. Finish: As indicated in Construction Documents.
- C. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.
- D. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

2.04 PRIMER

- A. Primer: Shop coat of red oxide rust - inhibitive primer

2.05 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
 1. Camber structural-steel members where indicated.
 2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 3. Mark and match-mark materials for field assembly.
 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
 - C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
 - D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
 - E. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- 2.06 SHOP CONNECTIONS
- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
- 2.07 SHOP PRIMING
- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Galvanized surfaces.
 - B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP3, "Power Tool Cleaning."
 - 2. SSPC-SP 6, "Commercial Blast Cleaning" shall be applied to the faying surfaces of connections that are noted on the drawings as slip-critical connections requiring a Class B surface. Apply this surface preparation to the area surrounding all bolt holes including the area up to 2" outside the outer-most holes.
 - C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 2 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Apply two coats of shop paint to inaccessible surfaces after assembly or erection.
- 2.08 SOURCE QUALITY CONTROL
- A. Owner may engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 - C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - 1. Liquid Penetrant Inspection: ASTM E 165.
 - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3. Ultrasonic Inspection: ASTM E 164.
 - 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Maintain erection tolerances of structural steel within AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."
- C. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- D. Splice members at contractors option.
- E. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened at bearing bolts and Slip critical at Braced Frames members.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303,"Code of Standard Practice for Steel Buildings and Bridges," for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform tests and inspections.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1.
 - 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION 05 12 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Steel framing and supports for mechanical and electrical equipment.
 - 2. Steel framing at perimeter of new openings in existing roof deck.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- C. Related Sections include the following:
 - 1. Division 03 Section "Miscellaneous Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
 - 2. Division 06 Section "Rough Carpentry" for metal framing anchors.

1.02 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F ambient; material surfaces.

1.03 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer, Licensed in the State of Texas, responsible for their preparation.
- B. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- C. Welding Certificates.
- D. Qualification Data: For qualified professional engineer.

1.04 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.06 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

2.02 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209 Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221 Alloy 6063-T6.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- D. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As indicated.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.108-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33; 0.0966-inch minimum thickness; hot-dip galvanized after fabrication.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- F. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- G. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- I. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.03 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A with hex nuts, ASTM A 563 and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.04 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
 - 1. Use primer with a VOC content of 350 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
 1. Use primer with a VOC content of 350 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Products:
 - a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
 - b. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
 - c. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
 - d. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.05 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and

2.06 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 1. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.
- C. Galvanize loose steel lintels located in exterior walls.

2.16 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.17 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

- 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
 - C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.
 - E. Prime exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated with zinc-rich primer.
- 2.18 FINISHES, GENERAL
- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - B. Finish metal fabrications after assembly.
- 2.19 STEEL AND IRON FINISHES
- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
 - B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B) and Items to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
 - C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.03 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.04 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Section "Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Rooftop equipment bases and support curbs.
 2. Wood blocking, cants, and nailers.
 3. Wood furring.
 4. Plywood backing panels.

1.02 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.04 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
1. Preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Power-driven fasteners.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood floor plates that are installed over concrete slabs-on-grade.
- 2.03 FIRE-RETARDANT-TREATED MATERIALS
- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.
 - C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
 - D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - E. Application: Treat items indicated on Drawings, and the following:
 1. Framing for raised platforms.
 2. Concealed blocking.
 3. Plywood backing panels.
- 2.04 MISCELLANEOUS LUMBER
- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 - B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
 1. Mixed southern pine or southern pine; SPIB.
 - C. Concealed Boards: 15 percent maximum moisture content of the following species and grades:
 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 - D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
 - E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
 - F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
- 2.05 PLYWOOD BACKING PANELS
- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
 - B. Plywood Rooftop Closer Panels: Exterior, Structural I sheathing.
 1. Span Rating: Not less than 24/0.
 2. Nominal Thickness: Not less than 23/32 inch.
- 2.06 FASTENERS
- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, roof assembly, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
 2. Stainless steel fasteners for securing wood and blocking to substrate.
 3. Stainless steel ring shank nails, for securing wood to wood, No. 11 gage, 9/32 -inch diameter head.
 - B. Nails, Brads, and Staples: ASTM F 1667.

- C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
 - D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
 - E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.
- 2.07 MISCELLANEOUS MATERIALS
- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
 - B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
 - C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
 - D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
 - E. Provide blocking and framing as indicated or as required to support facing materials, fixtures, specialty items, wall mounted TV's or flat panel displays, door stops, AV equipment and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
 - 2. Anchor blocking within wall stud cavities to support wall mounted items.
 - F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 - G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 - H. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
 - I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
 - J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
 - K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- 3.02 WOOD BLOCKING AND NAILER INSTALLATION
- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
 - B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
 - C. Offset successive layers of wood nailers, staggering ends 24-inches minimum; stagger lap joints of wood nailers at corners.
- 3.03 WOOD FURRING INSTALLATION
- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
 - B. Furring to Receive Plywood or Hardboard Paneling: Install 2-by-4-inch nominal-size furring vertically at 24 inches o.c.

3.04 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-faced architectural cabinets and educational casework.
 - 2. Plastic laminate faced counter tops
 - 3. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
 - 4. Cabinet hardware
- B. Related Requirements:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed blocking within other construction before cabinet installation.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products cabinet hardware and accessories and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
 - 3. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection:
 - 1. Plastic laminates.
 - 2. PVC edge material.
 - 3. Thermoset decorative panels.
- D. Samples for Verification:
 - 1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
 - 2. Thermoset decorative panels, 8 by 10 inches, for each color, pattern, and surface finish.
 - 3. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 - 4. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer fabricator.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Thermoset decorative panels.
 - 3. High-pressure decorative laminate.
 - 4. Glass.
 - 5. Adhesives.
- C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Must be certified for chain of custody by a third party certification group approved by FSC.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- C. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of typical architectural wood cabinets as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.06 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.01 ARCHITECTURAL CABINET FABRICATORS

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of architectural wood cabinets.
- B. Subject to compliance with requirements, provide plastic laminate faced casework produced by one of the following:
 - 1. PSI, Panel Specialists Inc.
 - 2. Global Casework; Houston, Texas
 - 3. Jericho Woodworks
 - 4. Ameritech, Inc.

2.02 ARCHITECTURAL WOOD CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
 - 2. Casework Design Series (CDS) numbers are indicated in the Drawings to identify cabinet component designs.

2.03 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Grade: Premium.
- C. Type of Construction: Frameless.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. Reveal Dimension: As indicated.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following:
 - a. Formica Corporation.
 - b. Panolam Industries International, Inc./Nevamar
 - c. Wilsonart International; Div. of Premark International, Inc.

- G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade VGS.
 - 3. Edges: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
 - 4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
 - 5. Formica ColorCore 2 Laminate, 90 Gloss Finish.
 - 6. Chemical Resistant Laminate: ANSI/NEMA LD# Compliant.
 - a. Cabinet surfaces at science labs and locations indicated on Drawings.
- H. Materials for Semi-exposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
 - b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
 - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued dovetail joints.
- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by laminate manufacturer's designations on the Drawings.

2.04 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- B. Hardwood Lumber: Kiln dried to 7 percent moisture content.
- C. Softwood Lumber: Kiln dried to 10 percent moisture content.
- D. Medium-Density-Fiberboard (MDF): ANSI A208.2, Grade 130; made with binder containing no urea formaldehyde.
 - 1. Recycled Content: Preconsumer or postconsumer recycled content not less than 20 percent.
 - 2. Minimum thickness: 3/4 inch.
- E. Hardboard: ANSI A135.4, Class 1 Tempered.
 - 1. Recycled Content: Preconsumer or postconsumer recycled content not less than 20 percent.
- F. Plywood: APA 3/8 inch; B-B Marine Grade, 4 x 8 made from Douglas Fir or Western Larch, solid-jointed core construction; HDO exterior face, maximum moisture content 12%.
 - 1. For casework core being manufactured without the use of urea formaldehyde.
 - 2. For products having chain-of-custody certificates certifying that the wood used in the casework complies with FSC requirements.

2.05 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Hinges: Five knuckle institutional type reveal overlay, minimum 0.072 inch steel, hospital tipped, non-removable pin, satin finish. Provide one pair for doors less than 4 ft. high and 1-1/2 pair for doors 4 ft. high and over.
- C. Pulls: Solid brass metal wire type, 5" wide, for drawers and swing doors, mounted with two screws fastened from back; Epc No.EPC-MC402-5-BRC or equivalent, brushed chrome. Provide two pulls for drawers over 24" wide. For sliding doors, provide recessed flush pulls.
- D. Catches: Door Catches: Ives 325, 326 Dual self-aligning permanent magnet type. Provide one at typical doors, two at doors 4 ft. high and over.
- E. Shelf Rests: BHMA A156.9, B04013; plastic, two-pin type with shelf hold-down clip.
- F. Drawer Slides: BHMA A156.9.
 - 1. Pull-out shelf slide: Accuride No. 322 or equivalent
 - 2. Drawer Slides: Full extension designed to permit easy removal, and yet prevent inadvertent drawer removal. Provide on all drawers, equal to or better than K&V #1286
 - 3. File Drawer Slides: Full extension designed to permit easy removal, and yet prevent inadvertent drawer removal. Provide on all drawers; K&V #8400 or approved equivalent.
- G. Cabinet Locks:

1. Door Locks: ANSI/BHMA A156.11, E07121: Olympus 100DR, US26D finish, masterkeyed 5 pin standard Keying shall be to Owner's master keying system. Key all cabinet locks alike. Provide two (2) keys per lock. Provide four (4) master keys.
 2. Drawer Locks: ANSI/BHMA A156.11, E07041; Olympus 200DW US26D finish, masterkeyed 5 pin standard Keying shall be to Owner's master keying system. Key all cabinet locks alike. Provide two (2) keys per lock. Provide four (4) master keys.
- H. Door and Drawer Silencers: BHMA A156.16, L03011.
- I. Label Holders: Provide where indicated; size to receive standard label cards approximately 1" x 2" nominal size, finished to match other exposed hardware
- J. Teachers Cabinet Wardrobe Rod: 1-1/16 inch o.d. rod supported by flanges, stainless steel finish.
- K. Teachers Cabinet Mirror: 10 inches x 12 inches with mounting clips.
- L. Wardrobe Hooks: Classroom Cubbies
1. Single: Epco CH201-ZBN2, Brushed Nickel finish
 2. Double: Epco CH202-ZBN2, Brushed Nickel finish
- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 2. Satin Stainless Steel: BHMA 630.
- N. Grommets: Doug Mockett & Company, Manhattan Beach, CA. 90266
1. RG2, Rectangular Flip-Top, 4-inch x 2-inch, color as selected by Architect
 2. TM1B-22, 6-inch by 2-inch, stainless steel grommet with trash management grommet lid TMLID1.
- O. Casters: Faultless, swivel, black nylon hood, dual wheel nylon caster, 2-inch diameter wheel and width, 90-pound capacity, Epco CS-50-1-TWH.
- P. Wall Mounted Counter Support Brackets: Hafele 287.77.002, 18-inches x 15-inches, stainless steel.
- 2.06 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- 2.07 FABRICATION
- A. Fabricate woodwork to dimensions, profiles, and details indicated.
1. Fabricate cabinet bodies with medium density fiberboard core except at locations adjacent to water sources.
 2. Fabricate cabinet bodies with marine grade plywood core at sink locations.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- D. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
- E. Bases: Cabinets shall be on solid wood bases constructed of preservative treated lumber. Back and side panels shall not extend to floor.
- 2.08 COUNTER TOPS AND ACCESSORIES
- A. Tops, Box Curbs, Splash Rim: Provide smooth, clean, exposed tops and edges, in uniform plane free of defects.
1. Top Sizes: Furnish tops in maximum practicable lengths.
 2. Top Thickness: Maintain 1-1/2 inch thickness with tolerance not exceeding plus or minus 1/32- inch. Provide front and end overhang of 1/2-inch over base cabinets. Treat edge as indicated on drawings.
 3. Provide marine grade plywood at all counter top sections scheduled to receive a sink or lavatory.
- B. Plastic Laminate: Provide plastic laminate sheet, complying with NEMA LD-3.

1. Use general purpose grade 0.050" thick for flat tops. Shop-bonded with fully waterproof bond glue to 3/4-inch thick sub-top plywood or medium density particleboard.
2. At sink bases, use only shop-bonded with fully waterproof bond glue.
3. Smooth sand surfaces to which plastic laminate is to be bonded. Apply standard phenolic backing sheet to back of panels.
4. Build up exposed edges of tops to 1-1/2 inch thickness. Self-edge exposed edges of top, splash, and openings with same plastic laminate used for tops. Unless otherwise indicated, top and back splash to be one piece.
5. Apply plastic laminate on front face of counter top prior to installing laminate on top surface (to provide laminate joint on vertical face as opposed to horizontal). Typical for edges not requiring bull nose.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.02 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 1. For shop finished items use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching of cabinets with transparent finish.
 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips. No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.03 INSTALLATION OF TOPS

- A. Field Jointing: Where applicable, make it same manner as factory joining using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings, factory prepared so there is no job site processing of top and edge surfaces.
- B. Fastenings: Use concealed devices for field joints, located within 6 inches of front, at back edges, and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Secure tops to cabinets with "Z"-type fasteners or equivalent, using 2 or more fasteners at each front, end and back.
- C. Workmanship
 1. Abut top and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices.
 2. After installation, carefully dress joints smooth, remove any surface scratches, clean and polish entire surface.
 3. Provide holes and cutouts as required for mechanical and electrical service fixtures.
 4. Provide scribe mouldings for closures at junctures of top, curb and splash with walls as recommended by manufacturer for materials involved. Use permanently elastic sealing compound recommended by manufacturer.
- D. Sink Installation: Sinks which were not factory installed shall be set in chemical resistant sealing compound and secured and supported per manufacturer's recommendations

3.04 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 16

SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories for wall finish at custodial sinks.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For plastic paneling and trim accessories.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Testing Agency: Acceptable to authorities having jurisdiction.

1.04 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.01 PLASTIC SHEET PANELING

- A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Kemlite Company Inc.
 - b. Marlite.
 - c. Nudo Products, Inc.
 - 2. Nominal Thickness: Not less than 0.075 inch.
 - 3. Surface Finish: Smooth As selected by Architect from manufacturer's full range.
 - 4. Color: As indicated on the Drawings.

2.02 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: Match panels.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Adhesive: As recommended by plastic paneling manufacturer.
- D. Sealant: Latex sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- B. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches wide.
 - 1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
 - 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.03 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive. Do not fasten through panels.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

- F. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 64 00

SECTION 07 21 01 – THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Glass-fiber blanket insulation installed in steel framed wall assemblies for acoustical treatment.
- B. Related Sections include the following:
 - 1. Division 23 Sections for HVAC mechanical insulation.

1.02 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.03 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
 - 1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm air velocity.
 - 2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with Chaetomium globosium on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation.
 - 2. Johns Manville.
 - 3. Owens Corning.
 - 4. Knauf Fiberglass
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
 - 1. 3-1/2 inches thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F.
- D. Accessories: 20 gage galvanized hexagonal poultry netting, 2 inches mesh.

2.02 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between exterior wall cavity insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets with wire mesh mechanically attached to flanges of metal studs.

3.05 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 65 16 – ROOF FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Formed equipment support flashing and roof penetration flashings.
 - a. Sheet metal counterflashing
 - b. Thermoplastic PVC roof membrane base flashing.

B. Related Sections:

1. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.

1.02 REFERENCES

- A. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
- B. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA): Architectural Sheet Metal Manual.
- C. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual for Architectural and Metal Products

1.03 PERFORMANCE REQUIREMENTS

- A. General: Membrane and sheet metal flashing and trim assemblies as indicated to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide flashing and trim that do not allow water infiltration to building interior.

1.04 SUBMITTALS

- A. Product List: Submit list of proposed Products and manufacturers, including all items specified in Part 2 – Products or otherwise required by the Work.
- B. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- C. Shop Drawings: Show fabrication and installation layouts of flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of special conditions.
 7. Details of connections to adjoining work.
 8. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
- D. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- E. Qualification Data: For qualified fabricator.
- F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- G. Warranty: Sample of special warranty.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- C. Preinstallation Conference: Conduct conference at Project site.
 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.

2. Review methods and procedures related to roof flashing and trim.
 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Deliver flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
 - B. Unload, store, and install roof flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
 - C. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- 1.07 COORDINATION
- A. Coordinate installation of roof flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.
 - B. Coordinate with demolition work and with work of other trades to ensure sufficient materials and manpower are available to completely replace or install and make watertight all roof openings.
- 1.08 WARRANTY
- A. Existing roof stem:
 1. System/manufacturer: Multiply PVC manufactured by Johns Manville.
 2. Warranty: ANM1180331460.
 - B. Existing Warranties:
 1. Perform work for new roof penetrations, curbs and flashing by methods and with materials so as not to void existing roofing system warranty issued by the manufacturer of the existing roof membrane system.
 2. Remove, replace, patch, and repair materials and surfaces cut or damaged during roofing work, by methods and with materials so as not to void existing roofing system warranty issued by the manufacturer of the existing roof membrane system.
 3. Notify warrantor before proceeding with the Work.
 4. Notify warrantor of existing roofing system on completion of new work, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect.
 - a. Submit documentation at Project closeout.

PART 2 - PRODUCTS

- 2.01 BASE FLASHING SHEET MATERIALS (Subject to approval by existing roof system manufacturer.)
- A. Flashing: Reinforced 60 mil membrane, white, non-fleece for all curbs, walls and penetrations.
 - B. Non-reinforced Membrane: Minimum 45 mill membrane, non-reinforced, white, minimum 45 mill membrane, non-fleece for multi angled intersections, sealant pockets and other conditions that are impractical for reinforced membrane application.
 - C. Adhesives:
 1. Flashing Adhesive: ASTM D 312 Type IV extra steep asphalt, supplied by the membrane manufacturer for laminating flashing to vertical surfaces.
 2. Sealants/Caulking: polyurethane caulking, exterior grade for caulking, surface reglets and vent pipe details. Sonneborn, NP1.
 - D. Detailing Components:
 1. Membrane Manufacturers Preformed Inside and Outside corners.
 2. Membrane Manufacturers Preformed Pipe Boots.
 3. Membrane Manufacturers Split Pipe Boots.
 4. Membrane Manufacturers Walkway and Traffic Pads: 30 inches wide by 60 feet long by 0.80 inch thick thermoplastic material provided by the membrane manufacturer; cut to size .
 5. Membrane Manufacturers Termination Bar.
- 2.02 RELATED MATERIALS
- A. Plumbing stacks should be 4lb (1.8kg) sheet lead formed and rolled.
 - B. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails

and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.

- C. Butyl Tape: 100% solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.
- D. Sheet Metal: 24-gauge pre-finished Galvanized as provided by the membrane manufacturer for warranty requirements.
- E. Sheet Metal Roof Opening Panels: 24-gauge stainless steel formed to fit roof openings.
- F. Insulation Materials: Roof Board Insulation as provided by the membrane manufacturer for warranty requirements.

2.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roof flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
 - 3. Verify membrane termination and base flashings are in place, sealed, and secure.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install roof flashing in accordance with manufacturer's instructions.
- B. Wood Nailers:
 - 1. Located and installed as required by membrane manufacturer.
- C. Flashing:
 - 1. Flash penetrations, walls, curbs, expansion joints, drains as shown on details and approved shop drawings with membrane manufacturers flashing membrane.
 - 2. Use prefabricated sealant pockets and pre-molded vent / pipe flashing.
 - 3. Mechanically fasten flashing at terminations according to approved details. Fastening flashing membrane through counter-flashing metal is not acceptable.
 - 4. Flashing membranes shall be adhered to the approved substrate with manufacturers Flashing Adhesive. Flashing Membrane is to be installed flat and wrinkle free. Flashings shall be rubbed or rolled onto the substrate for proper adhesion.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services:
 - 1. Provide existing roof system manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of system installation in accordance with manufacturer's instructions.
- B. Final Roof Inspection: Arrange for existing roofing system manufacturer's technical personnel to inspect roofing installation on completion. Final inspection and acceptance of the installation by the manufacturer's technical representative is required before a warranty can be issued.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.03 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Remove bitumen adhesive drippings from all walls, windows, floors, ladders and finished surfaces.
- D. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning instructions and conform to their instructions.

E. Repair or replace defaced or disfigured finishes caused by work of this Section.

END OF SECTION 07 65 16

SECTION 07 84 13 – FIRESTOPPING

PART 1 - GENERAL

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in/ joints between fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested firestop systems shall be used in specific locations as follows:
 1. Penetrations for the passage of duct, cable, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions) and horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 2. Openings between structurally separate sections of wall or floors.
 3. Gaps between the top of walls and ceilings or roof assemblies.
 4. Expansion joints in walls and floors.
 5. Openings and penetrations in fire-rated partitions or walls containing fire doors.
 6. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 1. Division 03 Section "Cast-In-Place Concrete"
 2. Division 07 Section "Joint Sealers"
 3. Division 04 Section "Unit Masonry"
 4. Division 09 Section "Gypsum Drywall Systems"
 6. Division 22 Sections for Plumbing
 7. Division 23 Sections for Mechanical Work
 8. Division 26 Sections for Electrical Work

1.05 REFERENCES

- A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 1. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXUV)
 - c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 2. Alternate "Omega Point Laboratories Directory" (updated annually).
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems" (July 1998.)
- D. Test Requirements: ASTM E 1966-01, "Standard test method for Fire Resistive Joint Systems"
- E. Inspection Requirements: ASTM E 2174 – 01, "Standard Practice for On-site Inspection of Installed Fire Stops."
- F. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- G. ASTM E-84-01, Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. Building codes:
 1. 2015 International Building Code
 2. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having

jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.
- B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- C. Submit material safety data sheets, provided with product, directly to the Owner.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below: (Note: First listed manufacturer is basis for design)
 - 1. Hilti, Inc.
 - 2. 3M; Fire Protection Products Division.
 - 3. Tremco; Sealant/Weatherproofing Division.

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E-814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Cast-in place firestop devices for use with non-combustible and combustible plastic pipe (closed and open piping systems) penetrating concrete floors, the following products are acceptable:
 - 1. Hilti CP 680 Cast-In Place Firestop Device

- a. Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
 - 2. Hilti CP 681 Tub Box Kit for use with tub installations.
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 604 Self-leveling Firestop Sealant
 - 3. Hilti CP 620 Fire Foam
 - 4. Hilti CP 606 Flexible Firestop Sealant
 - 5. Hilti CP 601s Elastomeric Firestop Sealant
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - 1. Hilti CP 601s Elastomeric Firestop Sealant
 - 2. Hilti CP 606 Flexible Firestop Sealant
 - 3. Hilti FS-ONE Intumescent Firestop Sealant
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 601s Elastomeric Firestop Sealant
 - 3. Hilti CP 606 Flexible Firestop Sealant
 - 4. Hilti CP 604 Self-leveling Firestop Sealant
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
 - 1. Hilti CP 677 Speed Plugs
 - 2. Hilti CP 767 Speed Strips
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
- H. Foams, intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti FS-ONE Intumescent Firestop Sealant
 - 2. Hilti CP 618 Firestop Putty Stick
 - 3. Hilti CP 620 Fire Foam
 - 4. Hilti CP 601s Elastomeric Firestop Sealant
 - 5. Hilti CP 606 Flexible Firestop Sealant
- I. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
 - 1. Hilti CP 618 Firestop Putty Stick
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
 - 1. Hilti CP 617 Firestop Putty Pad
- K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
 - 1. Hilti CP 642 Firestop Collar
 - 2. Hilti CP 643 Firestop Collar
 - 3. Hilti CP 645 Wrap Strips
- L. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - 1. Hilti CP 637 Trowelable Firestop Compound
 - 2. Hilti FS 657 FIRE BLOCK
 - 3. Hilti CP 620 Fire Foam
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - 1. Hilti FS 657 FIRE BLOCK
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 601s Elastomeric Firestop Sealant

- 3. Hilti CP 606 Flexible Firestop Sealant
- 4. Hilti CP 604 Self-Leveling Firestop Sealant
- O. Sealants for use as part of a Perimeter Fire Barrier System between fire-resistance-rated floors and exterior wall assemblies, the following products are acceptable:
 - 1. Hilti CP 672 Speed Spray
 - 2. Hilti CP 604 Self-leveling Firestop Sealant
- P. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- Q. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction being penetrated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices 3.03

INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.

- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.

- 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
- 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
- 3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 07 84 13

SECTION 07 92 10 - JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
 - 1. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - b. Joints between different materials.
 - f. Other joints as indicated or required to seal building envelope.
 - 2. Exterior joints in the following horizontal traffic surfaces: See Division 32 Section Concrete Site Paving and Walks.
 - a. Control, expansion, isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings.
 - c. Tile control and expansion joints.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Joints between different materials.
 - g. Other joints as indicated.
 - 4. Interior joints in the following horizontal traffic surfaces.
 - a. Other joints as indicated.
- B. Related Sections include the following:
 - 1. Division 07 Section "Firestopping" for sealing joints in fire-resistance-rated construction.
 - 2. Division 07 Section "Sheet Metal Flashing and Trim" for sealing joints in roof sheet metal flashing and trim.
 - 3. Division 08 Section "Glazing" for glazing sealants.\
 - 4. Division 32 Section "Concrete Site Paving" for sealing joints in concrete paving.

1.02 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.03 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
 - 1. Install 4 selected samples on wall surfaces for final approval by Architect.
- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than two pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 4. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.05 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.06 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, acceptable manufacturers include:
1. BASF Building Systems. (www.buildingsystems.basf.com)
 2. Pecora Corp. (www.pecora.com)
 3. Sika Corp. (www.sikausa.com)

2.02 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.03 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Joint Sealer Types:
 - 1. Exterior Wall Joints: Multicomponent Nonsag Urethane Sealant, ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
 - 2. Walkway, Paving and Curbs: Reference Division 32 specification sections.
 - 3. Interior Joints: Latex Sealant, comply with ASTM C 834, Type P, Grade NF.
 - 4. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
 - a. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - b. Products:
 - 1) Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - 2) United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.04 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) O (open-cell material) B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F . Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.05 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.

- b. Masonry.
- c. Unglazed surfaces of ceramic tile.
- 3. Remove laitance and form-release agents from concrete.
- 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates and apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

3.04 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

SECTION 08 11 13 – HOLLOW METAL FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Hollow-metal steel frames.
- B. Related Sections include the following:
 - 1. Division 08 Section "Glazing" for glazed lites in steel frames.
 - 2. Division 08 Section "Door Hardware".
 - 3. Division 09 Section "Painting" for field painting steel frames.

1.02 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and finishes for each type of steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
 - 1. Frame details for each frame type, including dimensioned profiles.
 - 2. Details and locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, accessories, joints, and connections.
 - 5. Details of glazing frames and stops showing glazing.
- C. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.07 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. 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 masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CURRIES Company; an ASSA ABLOY Group Company.
 - 2. Ceco Door Products; an ASSA ABLOY Group Company.
 - 3. Steelcraft; an Ingersoll-Rand Company.
 - 4. Door Pro Systems
 - 5. Pearland Industries
 - 6. Masonite Architectural

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- G. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching standard steel door frames of type indicated.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 08 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 - 2. Frames for Doors: 0.0785-inch thick (14 ga.) steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
 - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
 - 2. Frames for Level 3 Steel Doors: 0.0598-inch-thick (16 ga.) steel sheet.
 - 4. Metallic coated, minimum A60 zinc-iron-alloy (galvannealed) coating designation.
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
 - 1. Hinges: Minimum 0.123-inch-thick (10 ga.) by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
 - 2. Lock Face Closers, and Concealed Holders: Minimum 0.067-inch-thick (14 ga.).
 - 3. All Other Surface-Mounted Hardware: Minimum 0.067-inch-thick (14 ga.).
- E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- F. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- G. Floor Anchors: Formed from same material as frames, not less than 0.042-inch-thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- H. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.04 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032-inch-thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032-inch-thick, fabricated from same material as frames in which they are installed.

2.05 FABRICATION

- A. General: Fabricate standard steel frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
 - 4. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches in height.
 - 2) Three anchors per jamb from 60 to 90 inches in height.
 - 3) Four anchors per jamb from 90 to 120 inches in height.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches in height.
 - 2) Four anchors per jamb from 60 to 90 inches in height.
 - 3) Five anchors per jamb from 90 to 96 inches in height.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
 - 5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 - c. Compression Type: Not less than two anchors in each jamb.
 - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
6. Fabricate frames to receive horizontal blinds so that blinds are mounted within frame.
7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
 2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- D. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of doors and frames.
 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.06 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 1. Finish standard steel door and frames after assembly.
- B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint for reglazing welds in steel, complying with SSPC-Paint 20.
- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils .
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.
 - 1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Provide frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Standard Steel Frames: Install standard steel frames for doors, sidelights, borrowed lights and other openings, of size and profile indicated. Comply with SDI 105.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install frames with removable glazing stops located on secure side of opening.
 - c. Install door silencers in frames before grouting.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - f. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 6. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.
 - 1. Secure stops with countersunk flat-or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.
- C. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 12 16 - INTERIOR ALUMINUM FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Aluminum swinging door frames for interior use.
 - 2. Aluminum sidelite, borrowed lite and window frames for interior use.
- B. Related Sections include the following:
 - 1. Division 08 Section "Flush Wood Doors"
 - 2. Division 08 Section "Glazing"
 - 3. Division 09 Section "Gypsum Board Assemblies"

1.02 SUBMITTALS

- A. Product Data: Submit for frames and trim.
 - 1. Include information for factory finish, accessories and other required components.
 - 2. Include color charts for finish indicating manufacturer's standard colors available for selection.
- B. Shop Drawings: Submit schedule indicating opening identification number, frame types, dimensions, swing, label, and hardware requirements. Use same reference numbers for openings as Contract Drawings.
- C. Include elevations and details indicating frame types, profiles, conditions at openings, methods and locations of anchoring, glazing requirements, hardware locations, and reinforcements for hardware, details of connections to special construction and other custom features.
- D. Samples: Submit the following, if requested by architect :
 - 1. Samples indicating quality of finish in selected colors on alloys used for Work.
 - 2. Where normal color and texture variations are expected, include additional samples to show range of such variation.
- E. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide aluminum frames and accessories produced by a single manufacturer for each type of product indicated.
- B. Manufacturer's Qualifications: Manufacturer shall demonstrate previous experience in manufacturing of interior aluminum framing for a period of not less than 10 years on comparable sized project.
- C. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver frames and doors in cartons to provide protection during transit and storage at project site.
- B. Inspect frames and doors upon delivery for damage.
 - 1. Repair minor damage to pre-finished products by means as recommended by manufacturer
 - 2. Replace frames that cannot be satisfactorily repaired.
- C. Store frames at project site under cover and as near as possible to final installation location. Do not use covering material that will cause discoloration of aluminum finish.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Do not begin installation of frames until area of work has been completely enclosed and interior is protected from the elements.
- C. Maintain temperature and humidity in areas of installation within reasonable limits, as close as possible to final occupancy. If necessary, provide temperature control and ventilation to maintain required environmental conditions.

1.06 WARRANTY

- A. Warrant against defects in manufacturing of materials for a period of 2 years from date of substantial completion.
- B. Warrant framing finish against defects, including cracking, flaking, blistering, peeling, and excessive fading, chalking and non-uniformity in color for a period of 5 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Products:
 - 1. Interior Door Frames and Interior Light Frames: Frameworks, Type I System, fixed throat frames to accommodate wall thicknesses and ceiling heights as indicated on Drawings
- B. Subject to specified requirements, acceptable manufacturers include the following:
 - 1. Aluma Pro L.P. (www.alumaproframes.com)
 - 2. Western Integrated Materials, Inc. (www.western-integrated.com)

3. Wilson Partitions. (www.wilsonpart.com)

2.02 MATERIALS

- A. Aluminum: Meeting requirements of ASTM B221, 6063T5 alloy, and as otherwise required to assure compliance with dimensional tolerances and maintain color uniformity. Billets shall be composed of at least 33% recycled aluminum.
- B. Anchorage Devices, Clips and Fasteners: Manufacturer's standard type, compatible with materials being secured.
- C. Accessories: As necessary for complete system.

2.03 ACCESSORIES

- A. Door Seals: Replaceable synthetic pile strip or neoprene extrusions.
- B. Fasteners: Stainless or corrosion resistant coated steel.
- C. Include the gaskets for glazed doors and frames.
- D. Hinged Door Hardware: Specified in Section 08 71 00.
- E. Sliding Door Frame: Complete with frame, top track and hardware for top supported door.

2.04 FINISHES

- A. Factory finish extruded frame components so that all parts exposed to view upon completion of installation are uniform in finish and color. Exposed surfaces shall be free of scratches and other serious blemishes.
 - 1. Polyester Finish: AAMA 603.8, multiple stage electrostatically applied thermoset polyester finish; dark bronze color to match existing aluminum frames.

2.05 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Isolation of glazing from framing members.
 - 4. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 5. Fabricate frames to permit installation in stud partitions faced with gypsum board. Permit removal of frames without damage to partitions.
 - 6. Conceal frame fasteners with tight fitting snap-on trim.
 - 7. Fabricate frames with mitered corners.
- C. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
- D. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify wall thickness does not exceed manufacturer's recommended tolerances of specified throat size.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with frame manufacturer's printed installation instructions and approved shop drawings. Do not attempt installation in areas where wall thickness exceeds tolerances of specified throat size.
 - 2. Install frames plumb and square, free from warp or twist, securely anchored to substrates with fasteners recommended by frame manufacturer. Maintain dimensional tolerances and alignment with adjacent work. Ensure joints are hairline tight and surfaces flush with adjacent components.
 - 3. Set all doors in correct locations as shown on the drawings, level, square, plumb and in alignment with other work in accordance with the manufacturer's installation instructions and approved shop drawings.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
- C. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
 - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.03 ADJUSTING AND CLEANING

- A. Protect exposed portions of aluminum surfaces from damage by plaster, lime, acid, cement, and other contaminants.
- B. Touch up marred areas so that touch-up is not visible from a distance of 4 feet. Remove and replace frames that cannot be satisfactorily adjusted.

3.04 PROTECTION

- A. Protect as required to assure that frames will be without damage until Substantial Completion.

END OF SECTION 08 12 16

SECTION 08 14 23.16 – PLASTIC LAMINATE FACED WOOD DOORS

PART 1 - GENERAL

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Solid-core, wood doors, flush configuration with plastic laminate faces.
- B. Related Sections include the following:
 - 1. Division 08 Section "Glazing" for glass view panels in flush wood doors.
 - 2. Division 08 Section "Door Hardware" for hardware in flush wood doors.
 - 3. Division 08 Section "Hollow Metal Frames" for wood door frames.

1.03 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and identify cutouts for glazing.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts
- B. Product Data: Indicate door core materials and construction; veneer species, type, and characteristics; factory machining criteria; factory finishing criteria.
- C. Samples: Submit two samples of door veneer, 4"x4" in size illustrating plastic laminate pattern and color.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: High pressure decorative laminate faced doors shall conform to the latest edition of the following standards: NWWDA 1.S.1-A and AWI's "Architectural Woodwork Quality Standards Illustrated" for "Premium Grade" requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons. Do not store in damp or wet areas. Break seal on-site to permit ventilation.
- C. Mark each door package with door number used on Shop Drawings.

1.07 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.08 WARRANTY

- A. Warranty: Manufacturer's standard form, signed by manufacturer, and Installer in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup or twist) more than 1/4" in a 42 by 84 inch section, or show telegraphing of core construction in face.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion
 - a. Solid-Core Interior Doors: Life of installation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Graham; an Assa Abloy Group company
 - 2. Marshfield Door Systems, Inc.
 - 3. VT Industries

- 4. Oshkosh Architectural Door ompany
- 2.02 DOOR TYPES
 - A. Flush Interior Doors: 1-3/4-inch thick; solid core construction, fire rated as indicated
 - B. All wood doors are to meet criteria for NWWDA 1.S. 1-A and AWI - "Premium Grade."
- 2.03 DOOR CONSTRUCTION
 - A. Flush Bonded Particle Core Doors - non-rated locations
 - 1. AWI PC-HPDL-3, High Pressure Decorative Laminate (HPDL), Bonded Particleboard core.
 - 2. Stiles and rails are to be minimum 1-3/8-inch wide (before prefitting), mill option engineered hardwood. Provide lock blocks and 5-inch top rails for hardware reinforcement, 5-inch mid rails for exit devices.
 - 3. Core shall be particleboard 32 pounds per cubic foot average density. Comply with particleboard standard ANSI A208.1, Grade 1-LD.2.
 - 4. Crossbands: 1/8-inch thick min. hardwood composition applied to the core prior to application of 1/4-inch matching hardwood stiles; exposed crossbanding not allowed along stile edges
 - 5. Laminates to be applied to crossbanded core in hot press using Type I waterproof adhesive; five ply construction
- 2.04 FLUSH DOOR FACING
 - A. Plastic Laminate Facing: NEMA LD-3, 0.048-inch thick, finish, color, and pattern are as selected. Hardwood edges for staining or painting to match faces.
- 2.05 ADHESIVE
 - A. Facing Adhesive: Type I - waterproof. Do use adhesives containing urea formaldehyde.
- 2.06 ACCESSORIES
 - A. Metal Frames for Light Openings in Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for field painting.
 - B. Install in accordance with manufacturer's instructions.
- 2.07 FABRICATION
 - A. Fabricate doors in sizes indicted for Project –site fitting.
 - B. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.
 - C. Provide lock blocks at lock edge and at top of door (i.e., closer location) for hardware reinforcement.
 - D. Vertical Exposed Edge of Stiles: Hardwood with painted finish to match face of door
 - E. Fit door edge trim to edge of stiles after applying veneer facing.
 - F. Bond edge banding to cores.
 - G. Seal top and bottom edges.
 - H. Factory machine doors for finish hardware that is not surface applied to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware tmplates. Provide solid blocking for through bolted hardware.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Premachine astragals and formed –steel edges for hardware for pairs of fire-rated doors.
 - I. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind of door required.
- 2.07 FACTORY FINISHING
 - A. General: Comply with referenced quality standard for factory finishing.
 - B. Finish doors at factory.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location and swing characteristics and have been installed with level heads and plumb jambs.

- 2. Reject doors with defects.
 - B. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 INSTALLATION
- A. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - B. Hardware: For installation, see Division 08 Section "Door Hardware."
 - C. Trim door height by cutting bottom edges to a maximum of 3/4".
 - D. Trim non-rated door width by cutting equally on both jamb edges.
 - E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
 - F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project Site.
 - G. Pilot drill screw and bolt holes. Use threaded through bolts for half surface hinges.
 - H. Machine cut for hardware. Core for handsets and cylinders.
 - I. Coordinate installation of doors with installation of frames specified in Division 08 Section "Hollow Metal Doors and Frames" and hardware specified in Division 08 Section "Door Hardware."
- 3.03 ADJUSTING
- A. Operation: Rehang or replace doors that do not swing or operate freely.
 - B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 23.16

SECTION 08 14 23.18 – BULLET-RESISTANT PLASTIC-LAMINATE-FACED WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Bullet-resistant, solid-core, wood doors, full lite, flush configuration with plastic laminate faces and steel frame assemblies.
- B. Related Sections include the following:
 - 1. Division 08 Section "Door Hardware" for hardware in flush wood doors.

1.2 SUBMITTALS

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and identify cutouts for glazing.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts
- B. Product Data: Indicate door core materials and construction; veneer species, type, and characteristics; factory machining criteria; factory finishing criteria; bullet-resistant ratings.
- C. Samples: Submit two samples of door veneer, 4 inch x4 inch in size illustrating plastic laminate pattern and color.
- D. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain wood doors and frames through one source from a single manufacturer.
- B. Quality Standard: High pressure decorative laminate faced doors shall conform to the latest edition of the following standards: NWWDA 1.S.1-A and AWI's "Architectural Woodwork Quality Standards Illustrated" for "Premium Grade" requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons. Do not store in damp or wet areas. Break seal on-site to permit ventilation.
- C. Mark each door package with door number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Warranty: Manufacturer's standard form, signed by manufacturer, and Installer in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup or twist) more than 1/4" in a 42 by 84 inch section, or show telegraphing of core construction in face.
 - 1. Warranty shall be in effect during the following period of time from date of Substantial Completion: 10 years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Product: Bullet-resistant full lite, plastic-laminate-faced wood doors and steel frames manufactured by ARMORTEX, 5926 Corridor Parkway, Schertz, Texas, 800-880-8306, www.armortex.com, Door and Frame Assemblies: Ballistic Level 3, tested to UL 752.
- B. Subject to compliance with requirements, provide the comparable product by one of the following manufacturers.
 - 1. Total Security Solutions

2.2 MATERIALS

- A. Steel Sheet: ASTM A1008/1008M, cold rolled, free from scale, pitting, coil breaks, and other surface defects.
- B. Bullet-Resistant Composite: UL Listed Bullet Resistant Composite by ARMORTEX, of UL level equal to specified door and frame ballistic protection level.
- C. Plastic Laminate Facing: NEMA LD-3, 0.048-inch thick, finish, color, and pattern are as selected. Hardwood edges for staining or painting to match faces.

D. Bullet-Resistant Glazing: Level 3 in accordance with UL-752 Testing for Ballistic Resistance for the complete assembly including framing and Panels.

2.3 FABRICATION

A. Doors:

1. Solid core construction plastic-laminate faces, bullet-resistant composite core and solid 3/8 inch thick wood stile and rail edges.
2. Factory hang doors in frames using specified hinges.
3. Factory machine doors for finish hardware that is not surface applied to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, DHI A115-W series standards, and hardware templates. Provide solid blocking for through bolted hardware.
4. Vision Panels: Clear glazing material of same ballistic level as door and frame assembly.

B. Frames:

1. Same ballistic protection as doors.
2. Fabricate from 16 gage steel lined with bullet-resistant composite.
3. Weld frame corners; knock-down and mechanical joints not acceptable.

C. Welding: In accordance with AWS D1.3/D1.3M. Grind exposed welds flush and smooth.

D. Finish work neat and free from defects.

E. Allowable Tolerances: Plus or minus 1/16 inch for frame opening width, height, diagonal dimensions, and overall width and height (outside to outside).

F. Vertical Exposed Edge of Stiles: Hardwood with painted finish to match face of door

G. Seal top and bottom edges.

H. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind of door required.

2.7 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing.

B. Finish doors at factory.

PART 3 – EXECUTION

3.2 INSTALLATION

A. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.

B. Hardware: For installation, see Division 08 Section "Door Hardware."

C. Trim door height by cutting bottom edges to a maximum of 3/4".

D. Trim non-rated door width by cutting equally on both jamb edges.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project Site.

G. Pilot drill screw and bolt holes. Use threaded through bolts for half surface hinges.

H. Secure to adjacent construction using fastener type best suited to application.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 23.18

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Wall access doors and frames.
 - 2. Ceiling access doors and frames.
- B. Related Sections include the following:
 - 1. Division 09 Section "Gypsum Board."

1.02 SUBMITTALS

- A. Product Data: For each type of door and frame indicated. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings (if required) for access doors and frames.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain doors and frames through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.04 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Access Doors:
 - a. J. L. Industries, Inc.
 - b. Karp Associates, Inc.
 - c. Larsen's Manufacturing Company.
 - d. Milcor Limited Partnership.
 - e. Nystrom Building Products Co.

2.02 ACCESS DOORS AND FRAMES

- A. Non Fire Rated, Flush Access Doors with Concealed Flanges: Gypsum Board Walls and Ceilings
 - 1. Basis -of -Design Product: Bauco Plus BP58 manufactured by Acudor Products, Inc.

2.03 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, and surface defects; pickled and oiled; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M.
- C. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified nominal thickness according to ASTM A 568/A 568M. Electrolytic zinc-coated steel sheet, complying with ASTM A 591/A 591M, Class C coating, may be substituted at fabricator's option.
- D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

2.04 PAINT

- A. Shop Primers: Provide primers that comply with Division 09 Section "Painting."

2.05 FABRICATION

- A. General: Provide access door assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Aluminum Doors and Frames in Gypsum Board Construction
 - 1. Door: Aluminum extrusion with 5/8-inch drywall inserted into door panel.
 - 2. Frame: Recessed aluminum extrusion to provide edge similar to drywall bead.
 - 3. Hinge: Concealed non-corroding two point pin hinge; hinge to allow door panel to open to 120 degrees and allow for door panel removal.
 - 4. Latch: Screwdriver operated cam latch.
 - 5. Finish: Mill finish aluminum; Finish drywall insert to match surrounding gypsum board surface.
- D. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
2. Provide mounting holes in frames to attach frames to metal or wood framing in plaster and drywall construction and to attach masonry anchors in masonry construction.
3. Fabricate frames and non-fire rated door panels of 14 gauge steel, single sheet. Fabricate fire-rated door panels of 20 gauge steel double sheet with integral non-combustible insulation filler.
4. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - a. Self-latching direct action with paddle latch and cylinder lock, furnish two keys per lock and key all locks alike.
5. Hardware: Provide continuous piano type hinges at fire-rated doors and 175 degree steel hinges with removable pin and spiral lift spring at non-fire rated doors.

E. Sizes:

1. 24 inches by 24 inches at ceiling locations.
2. 18 inches by 18 inches minimum at wall locations unless noted otherwise or required to be of larger size.

2.06 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.07 STEEL FINISHES

- A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Advise installers of other work about specific requirements relating to access door and floor door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices.

3.02 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

3.03 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Exterior aluminum-framed storefronts.
 - a. Glazing is retained mechanically with gaskets on four sides.
 - 2. Modifications to existing aluminum framed storefront to receive addition of new framing.
 - 3. Exterior manual-swing aluminum doors.
- B. Related Sections:
 - 1. Division 07 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 2. Division 08 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - 3. Division 08 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - 4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- D. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
- E. Source quality-control reports.
- F. Field quality-control reports.
- G. Sample Warranties: For special warranties.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.07 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Two years from date of Substantial Completion.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after curtain wall installation.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.

5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units to function properly.
- B. Structural Loads: Exterior locations.
 1. Wind Loads: 136 miles per hour.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
- D. Structural-Test Performance: Test according to ASTM E 330 as follows:
 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
 4. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.
- E. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. Test High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Test Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Test Interior Ambient-Air Temperature: 75 deg F.
- F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.
- G. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- H. Water Penetration Under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
 1. Maximum Water Leakage: According to AAMA 501.1. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.
- I. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- J. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.05 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- K. Delegated Design: Engage a qualified professional engineer licensed in the State of Texas to design aluminum-framed entrances and storefronts to show compliance with specified structural performance requirements.

2.02 MANUFACTURERS

- A. Basis of Design Product:
 1. Exterior: The design for glazed aluminum storefront systems is based on Kawneer North America, Trifab VersaGlaze 450 framing systems for 1/4 - inch glazing at exterior locations.
 - a. Framing Member Profile: 1 3/4 inches x 4-1/2 inches, flush glazing, center set.
- B. Subject to compliance with requirements, provide the comparable product by one of the following manufacturers.

1. YKK APP
2. Oldcastle Building Envelope.
3. Tubelite

2.03 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308/B 308M.
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.04 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 1. Construction: Thermal at exterior locations.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Center.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 2. Reinforce members as required to receive fastener threads.
- D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- E. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.

2.05 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.

2.06 ENTRANCE DOOR SYSTEMS

- A. Doors: Manufacturer's standard glazed doors, for manual swing operation;
 1. Door Construction: 1-3/4 inch overall thickness, with minimum 0.125-inch -thick, extruded-aluminum tubular rail and stile members. Incorporating manufacturer's standard welded corner design.
 2. Door Design: Wide stile, 5 inch nominal width.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Glazing: 1-inch glazing at exterior locations; 1/4 inch at interior locations.
 - b. Provide nonremovable glazing stops on outside of door.

2.07 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware is specified in Section 08 71 00 "Door Hardware."
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.

- C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Cylinders: Owner's standard keying system
- 2.08 ACCESSORY MATERIALS
 - A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
 - B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.
- 2.09 FABRICATION
 - A. Form or extrude aluminum shapes before finishing.
 - B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from exterior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - C. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
 - D. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
 - E. Doors: Reinforce doors as required for installing hardware.
 - 1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
 - F. Hardware Installation: Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.
 - G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- 2.10 ALUMINUM FINISHES
 - A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - C. Class I, Color Anodic Finish: AA-M12C22A44, Dark Bronze.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" and to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F. Install glazing as specified in Division 08 Section "Glazing."
- G. Entrances Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Field-Installed Entrance Door Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install weatherseal perimeter joint sealant as specified in Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.
- 3.03 FIELD QUALITY CONTROL
- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of two tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 70 percent completion.
- 3.04 ADJUSTING
- A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

END OF SECTION 08 41 13

SECTION 08 41 13.15 – BULLET-RESISTANT ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Bullet Resistant Aluminum-framed storefront framing and doors for installation at interior secured reception lobby.

1.2 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants for installation of sealants installed with glazed aluminum storefronts.
- B. Section 08 71 00 – Door Hardware for scheduled door hardware and security access.
- C. Section 08 80 00- Glazing for installation of decorative films on storefront glazing.

1.3 REFERENCES

- A. ASTM B 209/B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. NIJ Standard 0108.01 - (National Institute of Justice) Standard for Ballistic Resistant Protective Materials.
- C. Underwriters Laboratories: UL 752 - Standard for Bullet Resisting Equipment.

1.4 PERFORMANCE REQUIREMENTS

- A. Design, fabricate and install all storefront materials specified in this section to meet or exceed the requirements of UL 752, Level 3.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Submit Manufacturer approved shop drawings detailing plan, section and elevation views as necessary to ensure proper field installation procedures. Coordinate locations with those listed in the Contract Drawings.
- C. Test Reports: Test reports (current UL Listing Verification & UL 752 Test Results as provided by Underwriters Laboratories), and printed data in sufficient detail to indicate compliance with the contract documents.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of five (5) years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation with the manufacturer's UL Listed Labels intact and legible.
- B. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations set by manufacturer. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Failure of operating components.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BULLET RESISTANT STOREFONT FRAMING

- A. Basis of Design Product: TSS 650 Pressure Plate Thermal Aluminum Frame assembly, manufactured by Total

Security Solutions, Inc., 170 National Park Drive, Fowlerville, MI 48836, 800-513-1468. Attn: Sales Department, info@tssbulletproof.com . Web: www.tssbulletproof.com.

- B. Subject to compliance with requirements, provide the comparable product by one of the following manufacturers.
 - 1. ARMORTEX, 5926 Corridor Parkway, Schertz, Texas, 800-880-8306, www.armortex.com.
- C. Frame: Extruded aluminum alloy 6063 T5 manufactured in accordance with ASTM B209. Anodized finish and free of sharp edges or burrs when in place.
 - 1. Head and Sill: One piece extrusions.
 - 2. Jamb: Two piece extrusions with removable faces to allow for re-glazing.
 - 3. Mullions: Three piece extrusions with removable faces to allow for glazing and individual lite replacement.
 - 4. Glazing must not be removable from the threat side of the sash.
 - 5. Frame dimensions: 2 inches by 5.1875 inches
 - 6. Polyester Finish: AAMA 603.8, multiple stage electrostatically applied thermoset polyester finish; dark bronze color to match existing aluminum frames.
- D. Glazing: Meets Underwriters Laboratories Standard 752, Level 3 for bullet resistance.
 - 1. Glazing Type: Acrylic

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1) Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1) Comply with manufacturer's written instructions.
 - 2) Do not install damaged components.
 - 3) Fit joints to produce hairline joints free of burrs and distortion.
 - 4) Rigidly secure nonmovement joints.
 - 5) Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6) Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:
 - 1) Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2) Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" and to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F. Entrances Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1) Field-Installed Entrance Door Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- G. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
 - 1) Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2) Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3) Alignment:
 - a) Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b) Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c) Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4) Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

2. ADJUSTING

- A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
 - 1) For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

END OF SECTION 08 41 13.15

SECTION 08 56 59 - SERVICE WINDOW UNITS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Self-Closing service window units.
- B. Related Sections:
 - 1. Section 08 41 13 - Aluminum-Framed Entrances And Storefronts.

1.02 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
- B. ASTM International:
 - 1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 2. ASTM B221/B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 - 4. ASTM E699 - Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
 - 5. ASTM F588 - Standard Test Methods for Resistance of Window Assemblies to Forced Entry Excluding Glazing.
- C. Consumer Products Safety Commission:
 - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, construction and glazing details as well as installation clearances and finishes.
- B. Product Data: Submit manufacturer's product data for specified Products indicating materials, operation characteristics, and finishes.
- C. Samples: Submit two samples, 4 x 4 inches (100 x 100 mm) in size illustrating metal finishes for each finish specified.
- D. Manufacturer's Installation Instructions: Submit installation instructions with requirements to accommodate specific site conditions.

1.04 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 10 years documented experience.
- B. Installer: Company specializing in installation of window systems specified with minimum three years documented experience.

1.05 DELIVERY, STORAGE AND PROTECTION

- A. Pack window units and accessories in manufacturer's standard shipping containers and protective packaging. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.
- B. Store window units and accessories on raised blocks to prevent moisture damage protected from exposure to weather and vandalism.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication and record on shop drawings.

1.07 COORDINATION

- B. Coordinate work with adjacent materials specified in other Sections and as indicated on Drawings and approved shop drawings.
- C. Coordinate installation of anchorages for security windows. Furnish setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation.

1.08 WARRANTY

- D. Furnish manufacturer's standard warranty document, in which manufacturer agrees to repair or replace windows that fail in materials or workmanship within specified warranty period. This warranty is in addition to, and not a limitation of other rights Owner has under the contract.
 - 1. Warranty Period:
 - a. One year parts and labor from date of installation.
 - 2. Failures include, but are not limited to, the following:

- a. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
- b. Structural failures including deflections exceeding 1/4 inch.
- c. Failure of welds.
- d. Excessive air leakage.
- e. Faulty operation of sliding window hardware.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum Extrusions: ASTM B221/B221M. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Metallic-Coated Steel Sheet:
 - 1. ASTM A653/A653M, CS (Commercial Steel), Type B; with G90 (Z275)zinc (galvanized) coating designation.
 - 2. AMS5511, steel, corrosion-resistant, sheet, strip, and plate, 19Cr - 9.5Ni (304L), solution heat treated.
 - 3. AMS5513, steel, corrosion-resistant, sheet, strip, and plate 19cr 9.2Ni (SAE 30304) solution heat treated.
- D. Stainless Steel Sheet, Strip, Plate, and Flat Bars:
 - 1. ASTM A666, austenitic stainless steel, Type 304, stretcher-leveled standard of flatness.
 - 2. ASME SA-240/SA-240M, chromium and chromium-nickel stainless steel plate, sheet, and strip for general applications.
- E. Concealed Bolts: ASTM A307, Grade A unless otherwise indicated.
- F. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.
- G. Gaskets: For gaskets required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Gaskets shall remain permanently elastic, nonshrinking, and nonmigrating.

2.02 SLIDING WINDOWS

- A. Basis of Design : Comparable to Model SC-4040 Single-Sliding Window Units as manufactured by Quikserv Corporation, or approved window units manufactured by the following manufacturers:
 - 1. Ready Access
- A. Model SC-4040 (Single Horizontal, Self-Closing Sliding Window Unit with Magnetic Hold Open): Modified to sizes indicated on Drawings.
 - 1. Service Opening: 20-1/4 inches (w)
 - 2. Rough Opening: 48-3/8 inches (w); height as indicated on Drawings.
 - 3. Finish: Clear.
 - 4. Hand: Left or right, as indicated on Drawings.
- B. Window Components:
 - 1. Glass: Laminated Glass, 1/4 inch thick float glass annealed, .090 inch PVB, 1/4 inch thick float glass annealed.
 - 2. Track/Slides: Stainless steel ball bearing slides all windows and drawers.
 - 3. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers, and with a proven record of compatibility with surfaces contacted in installation:
 - a. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
 - b. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
 - c. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - d. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 - 4. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, of sufficient strength to withstand design pressure indicated.
 - 5. Hook-Lock: Maximum security Adams Rite style hook lock on all sliders.

2.03 FABRICATION

- A. Fabricate window to dimensions indicated on Drawings.
- B. Fabricate windows and accessories to provide a complete system for assembly of components and anchorage .
 - 1. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.

- C. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.
 - D. Prepare components with reinforcement required for hardware.
 - E. Welding: To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 - F. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 - G. Pre-glazed Fabrication: Pre-glaze window units at factory.
 - H. Weather Stripping: Factory applied.
 - I. Bottom Sills: Stainless steel construction, no bottom tracks and no pop rivets.
 - J. Handles: Stainless steel, manufacturer's standard profile and finish.
- 2.04 SHOP FINISHING
- A. Aluminum Finishes:
 - 1. Colored Anodized Aluminum Surfaces: AA-M10C22A32 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class II, 0.7 mils clear anodized coating, conforming to AAMA 611.
 - B. Concealed Steel Items: Galvanized in accordance with ASTM A123 to thickness Grade 85, 2.0 oz. per sq. ft.
 - C. Stainless Steel: 304 Stainless Steel with NAAMM No. 3 finish.
 - D. Apply bituminous paint to concealed metal surfaces in contact with cementitious or dissimilar materials.
 - E. Extent of Finish:
 - 1. Apply factory coating to all surfaces exposed at completed assemblies.
 - 2. Apply finish to surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.
- PART 3 EXECUTION
- 3.01 EXAMINATION
- A. Verify existing conditions before starting work.
 - 1. Verify construction is ready to receive Products specified in this section.
 - 2. Verify rough openings are correct size and in correct location.
 - B. Examine roughing-in for embedded and built-in anchors to verify actual locations of window connections before security window installation.
 - C. Inspect built-in and cast-in anchor installations, before installing window units, to verify that anchor installations comply with requirements.
 - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
 - D. For glazing materials whose orientation is critical for performance, verify installation orientation.
 - E. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 PREPARATION
- A. Furnish frames and anchors to other sections as required for installation in surrounding partition and casework construction.
- 3.03 INSTALLATION
- A. Install window units in accordance with manufacturer's instructions.
 - B. Align window units plumb, level and square.
 - C. Rigidly secure window units to adjacent supporting construction.
 - D. Seal perimeter joints in accordance with Section 07 92 00.
 - E. Protection:
 - 1. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- 3.04 ADJUSTING
- A. Adjust horizontal-sliding windows to provide a tight fit at contact points for smooth operation and a secure enclosure.
 - B. Remove and replace defective work, including window units that are warped, bowed, or otherwise unacceptable.

3.05 CLEANING AND PROTECTION

- A. Remove protective material from factory finished surfaces.
- B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.
- D. Clean metal and glass surfaces to polished condition.
- E. Lubricate sliding window hardware.
- F. Provide temporary protection to ensure that window units are without damage at time of Substantial Completion.

3.06 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable security windows.

END OF SECTION 08 56 59

SECTION 08 56 68 - BULLET-RESISTANT TRANSACTION WINDOW

PART 1- GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Bullet-resistant transaction window assemblies.

1.2 REFERENCES

- A. American Welding Society (AWS) D1.6/D1.6M - Structural Welding Code - Stainless Steel.
- B. ASTM International (ASTM) A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. Underwriters Laboratories (UL) 752 - Bullet Resisting Equipment.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Provide window frames of "non-ricochet type" intended to permit capture and retention of attacking projectile, lessening potential of random injury or lateral penetration.
 - 2. Two way "natural voice" communication permitted by design of horizontal slide panel and glazing.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Include window profiles and sizes, type and spacing of frame anchors, reinforcement size and locations, details of joints and connections, and welding details.
 - 2. Product Data: Include product description for window assemblies including bullet-resistant ratings.
 - 3. Test Reports: Indicate compliance with specified bullet resistance performance rating.
- B. Closeout Submittals:
 - 1. Maintenance Data: Include instructions for cleaning of glazed panels.

1.5 QUALITY ASSURANCE

- A. Transaction Window Assemblies: Ballistic Level 3, tested to UL 752.
- B. Testing Agency Qualifications:
 - 1. Qualified according to ASTM E699 and experienced in ballistics- resistance testing.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Pack window units in manufacturer's standard shipping containers and protective packaging. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.
- B. Store window assemblies upright in protected, dry area, off ground or floor, with at least 1/4 inch space between individual units.
- C. Do not cover with non vented coverings that create excessive humidity.
- D. Remove wet coverings immediately.

PART 2 PRODUCTS

2.1 TRANSACTION WINDOW

- A. Manufacturer: Armortex, 11441 Britmoore Park Drive, Schertz, TX 78154, tel 210.661.8306.
- B. Acceptable manufacturers subject to compliance with specified requirements:
 - 1. Total Security Solutions: 935 Garden Lane, Fowlerville, MI 48836, tel. 800.513.1468.
 - 2. QuickServ Corporation
- C. Model WI-TW-AL-SW Aluminum Sliding Transaction Window: Fabrication assembly consisting of fixed and sliding bullet-resistant glazing panels, extruded aluminum perimeter metal frame, stainless steel track, roller track, double stainless steel roller guard, and bullet resistant armor.
 - 1. Stainless steel deal tray.
 - 2. Sliding panel: Pull and security latch.
 - 3. Size: As indicated on Drawings.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B221/B221M. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.
- B. Stainless Steel Sheet:
 - 1. ASTM A666, cold rolled, free from scale, pitting, coil breaks, and other surface defects.
- C. Ballistic Steel: Hi-Hard Ballistic Steel, of UL Ballistic Level equal to specified frame ballistic protection level.

- D. Glazing:
 - 1. UL Listed laminated polycarbonate: 4-ply, clear, polycarbonate.
- E. Sealants: Provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

2.3 FABRICATION

- A. Fabricate window to dimensions indicated on Drawings.
- B. Fabricate windows, and accessories to provide a complete system for assembly of components and anchorage of window, drawers and accessories.
 - 1. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.
 - 2. Prepare security windows for glazing unless preglazing at the factory is indicated.
- C. Rigidly fit and secure joints and corners with internal reinforcement. Make joints and connections flush, hairline, and weatherproof. Fully weld corners.
 - 1. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.
- D. Prepare components with reinforcement required for hardware.
- E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- F. Bottom Sills: Stainless steel construction, no bottom tracks and no pop rivets.
- G. Handles: Stainless steel, manufacturer's standard profile and finish.
- H. Frames:
 - 1. Fabricate from stainless steel.
 - 2. Weld frame corners; knock-down and mechanical joints not acceptable.
 - 3. Frame modules capable of being joined with other frame modules to form continuous line.
 - 4. Install glass in frames at factory.
- I. Mullions: Clear polycarbonate adhered to vision panels.
- J. Pass-thru Tray: 16 gage stainless steel, 10 x 16 inches to outside edge of flanges, recessed into counter, clear 1-5/8 inch open depth under glazing.
- K. Welding: In accordance with AWS D1.6/D1.6M. Grind exposed welds flush and smooth.
- L. Finish work neat and free from defects.
- M. Allowable Tolerances: Plus or minus 1/16 inch for frame opening width, height, diagonal dimensions, and overall width and height (outside to outside).

2.4 FINISHES

- A. Factory finish extruded frame components so that all parts exposed to view upon completion of installation are uniform in finish and color. Exposed surfaces shall be free of scratches and other serious blemishes.
- B. Polyester Finish: AAMA 603.8, multiple stage electrostatically applied thermoset polyester finish; dark bronze color to match existing aluminum frames.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify construction is ready to receive Products specified in this section.
- B. Verify rough openings are correct size and in correct location.
- C. Examine roughing-in for embedded and built-in anchors to verify actual locations of security window connections before security window installation.
- D. Inspect built-in anchor installations, before installing security windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
 - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
- E. For glazing materials whose orientation is critical for performance, verify installation orientation.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Furnish frames and anchors to other sections as required for installation in surrounding partition and casework construction.

3.3 INSTALLATION

- A. Install window assemblies in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set plumb, square, and level.
- C. Secure to adjacent construction using fastener type best suited to application.
- D. Field alterations to window assemblies not permitted unless approved in advance by manufacturer and Architect.

3.4 ADJUSTING

- A. Adjust horizontal-sliding, transaction security windows to provide a tight fit at contact points for smooth operation and a secure enclosure.

END OF SECTION 08 56 68

SECTION 08 71 00 - DOOR HARDWARE

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Hardware for hollow steel and plastic laminate doors.
- B. Thresholds.
- C. Weather-stripping, seals and door gaskets.

1.2 RELATED SECTIONS

- A. Section 08 11 00 – Metal Doors and Frames.
- B. Section 08 14 00 –Wood Doors.
- C. Section 08 33 00 – Coiling doors and Grilles.
- D. Section 08 34 00 – Special Function Doors.
- E. Section 08 40 00 – Entrances, Storefronts, and Curtain Walls.

1.3 REFERENCES

- A. ADA – Americans with Disabilities Act, Accessibility Guidelines.
- B. ANSI A117.1 – Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.
- C. NFPA 80 – Fire Doors and Windows.
- D. AWI – Architectural Woodwork Institute – Quality Standards.
- E. NFPA 101 – Code for Safety to Life from Fire in Buildings and Structures.
- F. NFPA 252 – Fire Tests of Door Assemblies.
- G. TAS – Texas Accessibility Standards.
- H. UL 10B – Fire Tests of Door Assemblies.
- I. UL 305 – Panic Hardware

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate locations and mounting heights of each type of hardware.
- C. Submit manufacturer's parts lists and templates.

- D. Manufacturers Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- E. All templates will be included with submittal documents to be turned over to door supplier.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01 70 00.
- B. Record actual locations of installed cylinders and their master key code.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 01 70 00.
- B. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.

1.7 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
 - 1. ADA.
 - 2. ANSI A117.1.
 - 3. NFPA 101.
 - 4. NFPA 80.
 - 5. NFPA 252.
 - 6. TAS.

1.8 QUALIFICATIONS

- A. Hardware Supplier Company specializing in supplying commercial door hardware with five years documented experience.
- B. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.

1.9 REGULATORY REQUIREMENTS

- A. Conform to applicable code for requirements applicable to fire rated doors and frames.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.
- B. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

- C. Deliver keys to Owner by security shipment direct from hardware supplier.

1.11 COORDINATION

- A. Coordinate work under provisions of Section 01 03 90.
- B. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.

1.12 WARRANTY

- A. Provide five year warranty under provisions of Section 01 70 00.
- B. Warranty: Include coverage for door closers.

1.13 MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Section 01 70 00.
- B. Provide special wrenches and tools applicable to each different or special hardware component.
- C. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 – PRODUCTS

2.1 HINGING METHODS:

- A. Note: drawings typically depict doors at 90 degrees doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.
- B. Hinges: Steel or stainless steel pins and concealed bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
 - 1. Three hinges per leaf to 7 foot, 6 inch height. Add one for each additional 30 inches in height, or any fraction thereof.
 - 2. Extra heavy weight hinges on doors over 3 feet, 5 inches in width.
 - 3. Extra-heavy weight hinges on doors with panic hardware or fire exit devices.
 - 4. Outswinging exterior doors: non-ferrous with non-removable (NRP) pins.
 - 5. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.
 - 6. Provide shims and shimming instructions for proper door adjustment.
 - 7. All hinges to be ball bearing type on high use or doors with closers. Plain Bearing hinges are acceptable for any door that is not high traffic without a closer.
 - 8. Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.

Acceptable Manufacturers: Ives, PBB, Hager

- C. Continuous Hinges:

- 1. Pin and barrel stainless steel at all Exterior high traffic (HM) doors 700 Series.
- 2. Geared-type aluminum at all Exterior high traffic (Aluminum) doors 112XY series.
- 3. Geared-type aluminum at all Interior high traffic doors 112XY series.

Acceptable Manufacturers: Ives, Markar, Pemko

2.2 LOCKSETS, LATCHSETS, DEADBOLTS:

- A. Extra Heavy Duty Mortise Locks and Latches:

- 1. Chassis: cold-rolled steel. All functions must be available in one body. Case must be multi-function, minimum 10 functions in one case, able to be opened and worked on without voiding the warranty. Functions will be changed by changing the cam on the back of the cylinder. Latch must be all steel. Pot metal on the latch will not be accepted.
- 2. Latchbolts: 3/4 inch throw, 2 piece stainless steel anti-friction type.
- 3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
 - a. Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
- 4. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
- 5. Deadbolts: stainless steel 1-inch throw.
- 6. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

- a. ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
- b. ANSI/ASTM F476-84 Grade 31 UL Listed.

B. On renovations smaller than 20 doors, consult district lock shop

BASIS OF DESIGN: SCHLAGE L9000 17A SERIES (NO SUBSTITUTION)

2.3 KEYING REQUIREMENTS:

Key System: All cylinders will be keyed into the district’s patented restricted existing small format interchangeable core key system. Cylinders must be compatible across small format interchangeable core and conventional format cylinders keyed to existing district A2 system. A vertical traveling pin will be used for a patent and placement shall be near the front of the cylinder for easy drilling of damaged cores. A restricted order verification system must currently in place to verify orders. A minimum of 5 keyways must be available in the system. Cores must be warranted in any manufacturer’s hardware. All keyways in the family must be able to be operated by one key. System must be patented until 2029. Key system must be UL437 capable. A preliminary key meeting will be held to establish guidelines for the system and a secondary key meeting will be held to review the proposed key system. Permanent cores shall be Contractor Furnished to be shipped directly to the district lock shop for owner installation. A construction key system will be in place during the construction period. Three control keys for the construction key system will be turned over to the district for installation of the permanent cores. Provided CKC Key Control all cores. Furnish (5) GMKS, (5) MKYS per set, (2) Change Keys per core. Bitting list must be provided in Excel spreadsheet format from the manufacturer to be directly input by file transfer into Sitemaster.

BASIS OF DESIGN: SCHLAGE EVEREST 29R (NO SUBSTITUTION)

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features:

- 1. Independent lab-tested 1,000,000 cycles. Must meet ANSI-156.3 – 2014.
- 2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated.
- 3. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function. Center case must be constructed of pressed steel, CAST STEEL ZINC DICHROMATED WILL NOT BE ACCEPTED. Four screws minimum will be required to fasten the center case.
- 4. Releasable in normal operation with 15-lb. maximum operating force, and with 32 lb. maximum pressure under 250-lb. load to the door.
- 5. Extruded aluminum grooved body.
- 6. Both solenoid and motorized electronic latch retraction must be available.

B. Specific features:

- 1. Supply rim devices with key removable mullion at all openings. *(Surface/Concealed vertical rods WILL NOT be accepted).*
- 2. Non-Fire Rated Devices: cylinder dogging.
- 3. Exit Device Trim: Stainless steel (Exterior/Interior) **vandal resistant trim** thru-bolted to device with plastisol coated grip. Night latch function retracts latch with use of key.
- 4. Fire-Labeled Devices: UL label indicating “Fire Exit Hardware”.
- 5. Delayed Egress Devices: Function achieved within single exit device component, including latch, delayed locking device, request-to-exit switch, nuisance alarm, remote alarm, key switch, indicator lamp, relay, internal horn, door position input, external inhibit input plus fire alarm input. NFPA 101 “Special Locking Arrangement” compliant.

6. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
7. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

BASIS OF DESIGN: VON DUPRIN 99 (NO SUBSTITUTION)

2.5 CLOSERS

B. Surface Closers:

1. Full rack-and-pinion type cylinder with molded plastic cover and cast iron body. Pinion must be 3/4". Bearings must be full compliment. Arms must be forged steel. Minimum .625" bearing height required. Body must be powder coated, not spray lacquer. Size adjustment must be verified by visual aid on the end of the cylinder with a numeric dial. Snap on covers are to be standard.
2. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
3. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
4. Opening pressure: Exterior doors 8.5 lb., interior doors 5 lb., labeled fire doors 15 lb.
5. Separate adjusting valves for closing speed, latching speed and backcheck
6. Parallel Rigid arms (PR) at exterior doors scheduled with parallel arm units.
7. Exterior doors do not require seasonal adjustments in temperatures from 120 degrees F to -30 degrees F, furnish data on request.
8. Pressure Relief Valves (PRV): unsafe, not permitted.
9. Permanent metal templates must be available for installation.

BASIS OF DESIGN: LCN 4040XP SERIES (NO SUBSTITUTION)

2.6 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design, "LBR" type where scheduled.
- B. Surface Bolts: Shall be used at pairs of doors from non-fire rated Mechanical rooms for the inactive leaf.
- C. Overhead Stops: Stainless steel (100 series). Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- D. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- E. Door Stops: Provide stops to protect walls, casework or other hardware.
 1. Unless otherwise noted in Hardware Sets, provide wall type Ives WS406/WS407 series with appropriate fasteners (AND WOOD BLOCKING) provided. Where wall type cannot be used, provide floor type. (Ives FS18S exterior and FS436 Interior) If neither can be used, provide overhead type.
 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- F. Seals: Finished to match adjacent frame color. Resilient seal material: polypropylene, nylon brush, or solid high-grade neoprene. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability.

Proposed substitutions: submit for approval.

1. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.
 2. Non-corroding fasteners at in-swinging exterior doors.
 3. Exterior pairs of mechanical room doors: Doors shall be equipped with appropriate seals, astragal, threshold, drip cap and sweeps to prevent the intrusion of rain water. Provide astragals at all interior pairs of doors to mechanical rooms.
 4. Sound control openings: Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leafs have the necessary sealed-in-place STC ratings. Adhesive mounted components not acceptable. Fasten applied seals over bead of sealant.
 5. Fire-rated Doors, Resilient Seals: UL10C / UBC Standard 7-2 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this project where rigid housed seals are scheduled.
 6. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C / UBC Standard 7-2. Where required, Intumescent seals vary in requirement by door type and door manufacture -- careful coordination required. Adhesive-applied Intumescent strips are not acceptable, use concealed-in-door-edge type or kerfed-in-frame type.
 7. All exposed exterior doors not under a cover are to have a rain drip to extend four inches outside the width of the door.
- G. Automatic door bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.
- H. Thresholds: As scheduled and per details. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
1. Exteriors: Seal perimeter to exclude water and vermin. Use butyl-rubber or polyisobutylene sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 2. Acoustic openings: Set units in full bed of Division-7-compliant butyl-rubber or polyisobutylene sealant, leave no air space between threshold and substrate.
 3. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
- I. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- J. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.
- K. Wall- & Floor-mounted electromagnetic door holders: LCN's SEM series or approved equivalent. Incorporate into U.L.-listed fire & life-safety system, doors release to allow closure and latching when door's zone is in alarm state. Use minimum projection required to allow door to open as widely as allowed by wall conditions and projection of door hardware.

BASIS OF DESIGN: IVES, SUBSTITUTIONS INCLUDE BUT ARE NOT LIMITED TO TRIMCO, HAGER, ROCKWOOD, AND OTHER PRODUCTS MEETING THIS STANDARD.

2.7 FINISH:

- A. Generally BHMA 626 Satin Chromium
 - 1. Areas using BHMA 626 to have push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise noted.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.
- C. Aluminum items: match predominant adjacent material. Seals to coordinate with frame color.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify that doors and frames are ready to receive work and dimensions are as instructed by the manufacturer.
- C. Verify that electric power is available to power operated devices and of the correct characteristics.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use templates and fasteners provided by hardware item manufacturer.
- C. Use sex bolts to attach panic devices to wood doors and all closers.
- D. Hardware installer shall be an entity that specializes in hardware installation and must have a minimum of ten years experience and provide five reference jobs of similar scope. Submit references with hardware submittals/shop drawings.
- E. Hardware installer is required to send all personnel that will install on this job shall attend a pre-installation meeting with the manufacturer's representative to review the install instructions.
- F. Contractor will install permanent cores and turn all keys over to the district.

3.3 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01500.
- B. Do not permit adjacent work to damage hardware or finish.

3.6 HARDWARE SETS

111947 OPT0372424 Version 2
Hardware Group No. 001SL - SLIDING WINDOW

For use on Door #(s):
PROVIDE EACH SL DOOR(S) WITH THE FOLLOWING:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
		ALL HARDWARE	PROVIDED BY OTHERS		

-COORDINATE HARDWARE WITH DOOR MFR.

Hardware Group No. 103 - SGL OFFICE

For use on Door #(s):
PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050HD 17A L583-363	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 103-EX - SGL OFFICE

For use on Door #(s):
PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 QTY REQD	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050HD 17A L583-363	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE SET IS A GUIDELINE.
GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.
IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.
PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. 201 - SGL STORAGE CLOSER

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 201CT-EX - SGL STORAGE CLOSER

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 QTY REQD	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE SET IS A GUIDELINE.

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.

PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. 201T - SGL STORAGE CLOSER

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 203 - SGL STORAGE

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 203-EX - SGL STORAGE

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE SET IS A GUIDELINE.

(FIELD-VERIFY AND REPLACE NECESSARY COMPONENTS BASED ON HW SET)

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO BID DATE.

PROVIDE ALL PRODUCTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.

Hardware Group No. 203T - SGL STORAGE

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 501 - SGL CLASSROOM LOCK CLOSER

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 501T - SGL CLASSROOM LOCK CLOSER

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 503 - SGL CLASSROOM LOCK

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070HD 17A	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 553 - SGL STORAGE LOCK (CLASSROOM)

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP QTY REQD	652	IVE
1	EA	CLASSROOM SECURITY	L9071HD 17A	626	SCH
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 553-EX - SGL STORAGE LOCK (CLASSROOM)

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP QTY REQD	652	IVE
1	EA	CLASSROOM SECURITY	L9071HD 17A	626	SCH
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE SET IS A GUIDELINE.

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.

PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. 553S-EX - SGL STORAGE LOCK (CLASSROOM)

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP QTY REQD	652	IVE
1	EA	CLASSROOM SECURITY	L9071HD 17A	626	SCH
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	OH STOP	900S SERIES X SIZE & MOUNTING AS REQD	630	GLY
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

HARDWARE SET IS A GUIDELINE.

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY. PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. 711 - SGL EXIT DEV VANDAL TRIM

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
1	EA	PANIC HARDWARE	CD-99-EO-SNB	626	VON
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SFIC MORT CYLINDER	80-132 W/KEYED CONST. CORE	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 NL SNB	630	IVE
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS WHERE APPLICABLE	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 711C - SGL EXIT DEV VANDAL TRIM

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
1	EA	PANIC HARDWARE	CD-99-EO-SNB	626	VON
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SFIC MORT CYLINDER	80-132 W/KEYED CONST. CORE	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 NL SNB	630	IVE
1	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS WHERE APPLICABLE	630	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 715-EX - SGL EXIT DEV EXTERIOR (HM) EXISTING DOOR/FRAME

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	700-HEIGHT REQD	630	IVE
1	EA	PANIC HARDWARE	CD-99-EO-SNB	626	VON
2	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SFIC MORT CYLINDER	80-132 W/KEYED CONST. CORE	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS WHERE APPLICABLE	630	IVE
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	JAMB SEAL	328AA-2PC-JAMB HEIGHT	AA	ZER
1	EA	HEADER SEAL	429AA-1PC-HEADER WIDTH	AA	ZER
1	EA	DOOR SWEEP	39A-DOOR WIDTH	A	ZER
1	EA	THRESHOLD	655A-EV3-FRAME WIDTH (OR AS DETAILED)	A	ZER
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O

HARDWARE SET IS A GUIDELINE.

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.

PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. 801 - PUSH/PULL

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8303 8" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. 801L - PUSH/PULL/ DEADLOCK (PUBLIC RESTROOM)

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM DEAD LOCK	L463HD	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8303 8" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER

Hardware Group No. C201 - SGL LOCK - ACCESS CONTROLLED (WHERE NOTED AND IDF/MDF)

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	EU MORTISE LOCK	L9092HDEU 17A CON 12/24 VDC	626	SCH
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SURFACE CLOSER	4040XP-RW/PA-TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR STOP (TYPE REQD)	WS406/WS407CCV/FS436/OH STOP - AS REQD	626	IVE
1	EA	GASKETING	488S PSA H & J (USE SILENCERS @ NON-RATED DOORS)	BK	ZER
1	EA	VARIABLE LENGTH WIRE HARNESS	CON-XXP LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		B/O
	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O
	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		B/O

Hardware Group No. C714MA - PAIR EXIT DEV EXTERIOR (ALUM) ACCESS CONTROLLED

For use on Door #(s):

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
1	EA	CONT. HINGE	112XY EPT HEIGHT AS REQ	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	KEYED MULLION	KR4954-STAB-MT54	689	VON
1	EA	PANIC HARDWARE	CD-99-EO-SNB	626	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-EO-CON-SNB 24 VDC	626	VON
3	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
2	EA	SFIC MORT CYLINDER	80-132 W/KEYED CONST. CORE	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA	689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30	689	LCN
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
	SET	SEAL	PERIMETER SEAL BY FRAME MFR.		
	SET	ASTRAGAL	MEETING STILE SEAL BY DOOR MFR.		
2	EA	DOOR SWEEP	39A-DOOR WIDTH	A	ZER
1	EA	THRESHOLD	655A-EV3-FRAME WIDTH (OR AS DETAILED)	A	ZER
4	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
2	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		B/O
	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O
	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		B/O

Hardware Group No. C714MA-EX - PAIR EXIT DEV EXTERIOR (ALUM) ACCESS CONTROLLED

For use on Door #(s):

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY HEIGHT AS REQ	628	IVE
1	EA	CONT. HINGE	112XY EPT HEIGHT AS REQ	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	KEYED MULLION	KR4954-STAB-MT54	689	VON
1	EA	PANIC HARDWARE	CD-99-EO-SNB	626	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-EO-CON-SNB 24 VDC	626	VON
3	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
2	EA	SFIC MORT CYLINDER	80-132 W/KEYED CONST. CORE	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA	689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30	689	LCN
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
	SET	SEAL	PERIMETER SEAL BY FRAME MFR.		
	SET	ASTRAGAL	MEETING STILE SEAL BY DOOR MFR.		
2	EA	DOOR SWEEP	39A-DOOR WIDTH	A	ZER
1	EA	THRESHOLD	655A-EV3-FRAME WIDTH (OR AS DETAILED)	A	ZER
4	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
2	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		B/O
	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O
	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		B/O

HARDWARE SET IS A GUIDELINE.

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTAL/ORDERING. PROVIDE/REPLACE ALL PRODUCTS/COMPONENTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY. PROVIDE FILLER/COVER PLATES/BONDO/ETC WHERE REQUIRED.

Hardware Group No. C715A - SGL EXIT DEV EXTERIOR (ALUM) ACCESS CONTROLLED

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT HEIGHT AS REQ	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-EO-CON-SNB 24 VDC	626	VON
1	EA	SFIC EVEREST PERM CORE	80-037 CKC EV29 R	626	SCH
1	EA	SFIC RIM CYLINDER	80-159 W/KEYED CONST. CORE	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP-SCUSH-SNB	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA	689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30	689	LCN
1	EA	RAIN DRIP	142A DW + 4"	AA	ZER
	SET	SEAL	PERIMETER SEAL BY FRAME MFR.		
1	EA	DOOR SWEEP	39A-DOOR WIDTH	A	ZER
1	EA	THRESHOLD	655A-EV3-FRAME WIDTH (OR AS DETAILED)	A	ZER
2	EA	HARNESS (1 IN DOOR & 1 IN FRAME)	ALLEGION CONNECT TYPE & LENGTH AS REQ		SCH
1	EA	HARNESS (TO POWER SUPPLY)	CON-6W - CONNECTION LEADS		SCH
	EA	BALANCE HARDWARE	BY DOOR MFG		B/O
	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		B/O
	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O
	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		B/O

Hardware Group No. CE715A-EX - SGL EXIT DEV EXTERIOR (ALUM) ACCESS CONTROLLED

For use on Door #(s):

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC OR M490 MAG LOCK AS REQD	630	VON
	EA	CREDENTIAL READER	BY SECURITY CONTRACTOR		B/O
	EA	DOOR CONTACT	BY SECURITY CONTRACTOR		B/O
	EA	POWER SUPPLY	BY SECURITY CONTRACTOR		B/O
	EA	BALANCE OF HARDWARE	EXISTING TO REMAIN		B/O

HARDWARE SET IS A GUIDELINE.

(FIELD-VERIFY AND REPLACE NECESSARY COMPONENTS BASED ON HW SET)

GENERAL CONTRACTOR/HW SUPPLIER FIELD-VERIFY EXISTING CONDITIONS PRIOR TO BID DATE.

PROVIDE ALL PRODUCTS NECESSARY FOR COMPLETE, FUNCTIONING COMPLIANT OPENING. ADVISE ARCHITECT OF ANY INCOMPATIBILITY REGARDING DOOR/FRAME/HARDWARE. GC AND HARDWARE SUPPLIER TO REVIEW ALL OPENINGS/HARDWARE SETS WITH OWNER/ARCHITECT AT LATER DATE TO DETERMINE EXACT REQUIREMENTS.

IN SUBMITTAL PROVIDE NAME, COMPANY AND DATE OF FIELD VERIFICATION. REPLACE ANY EXISTING MECHANICAL/ELECTRICAL HARDWARE THAT DOES NOT OPERATE PROPERLY.

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Door#	HwSet#
200	C714MA-EX
201	201T
202	553S-EX
202B	103
202C	103
202D	103
202E	203
203	553-EX
204	553S-EX
205	201CT-EX
205A	203-EX
206	203T
207	C714MA-EX
208	801
208A	553
208B	553
208C	553
208D	553
208E	553
208F	553
208G	553
208H	501T
208J	001SL
210	711
210A	103

Door#	HwSet#
210B	001SL
211	553
211A	553
212	201
213	711
273	715-EX
300	C714MA-EX
301	711C
302	711
302A	711
302B	203
302C	503
302D	CE715A-EX
302E	CE715A-EX
303	711
303A	001SL
303B	711
304	103
305	103
306	103
307	203
308	503
309	503
311	801L
311A	801
312	801L
312A	801
314	553
314A	553
315	203
317	711C
318	711
318A	711
319	203
320	C714MA
321A	501
322	103-EX
323	501
331	201
332	201
333	C201
334	103
335	711
336	103
337	503
338	103

Door#	HwSet#
339	711
340	103
341	503
342	103
343	711
345	C715A
351	711
353	201
354	553
355	711
356	C714MA
357	711
358	553
359	201
360	553
361	553
362	553
363	711
363A	C714MA-EX
364	201
373	715-EX

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Doors.
 - 2. Glazed entrances.
 - 3. Interior borrowed lites.
 - 4. Exterior storefront framed glazing.
- B. Related Sections include the following:
 - 1. Division 08 Section "Hollow Metal Doors and Frames."
 - 2. Division 08 Section "Plastic Laminate Faced Wood Doors."
 - 3. Division 08 Section "Aluminum Framed Entrances and Storefronts."

1.02 DEFINITIONS

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

1.03 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch-square Samples for glass.
 - 1. Each color of tinted float glass.
 - 2. Laminated Glass.
 - 3. For each color (except black) of exposed glazing sealant indicated.
- C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. Qualification Data: For installers.
- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: For each of the following types of glazing products:
 - 1. Coated float glass.
 - 2. Glazing sealants.
 - 3. Glazing gaskets.
 - 4. Safety glass.
- H. Special Warranty: Submit manufacturer's special warranty as required under Part 2 sections.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- C. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- D. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI Z97.1.

1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
- E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
- 1.05 DELIVERY, STORAGE, AND HANDLING
 - A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- 1.06 PROJECT CONDITIONS
 - A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
- 1.07 WARRANTY
 - A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 1. AGC Glass Company
 2. Guardian Glass, LLC
 3. Viracon
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
 1. Obtain glass from single source from single manufacturer.
- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.02 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 1. Wind Design Data: As indicated on Drawings.
 2. Ultimate Wind Speed: 136 mph (3 sec gust).
 3. Risk Category II
 4. Exposure Category: B.
 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Safety Glazing: Provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For laminated-glass lites, properties are based on products of construction indicated.

2.03 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

- B. Safety Glazing Labeling: Permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
 - C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 - D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article.
- 2.04 GLASS PRODUCTS
- A. Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.
- 2.05 LAMINATED GLASS
- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
 - 4. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets.
- 2.06 GLAZING GASKETS
- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
- 2.07 GLAZING SEALANTS
- A. General: Provide products of type indicated, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- 2.08 GLAZING TAPES
- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
 - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- 2.09 MISCELLANEOUS GLAZING MATERIALS
- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
 - B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
 - C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 - D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 - F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- 2.10 FABRICATION OF GLAZING UNITS
- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
2. Differential values in "Temperature Change" Subparagraph below (for aluminum in particular) are suitable for most of the United States.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Presence and functioning of weep system.
 3. Minimum required face or edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- L. Install window film in accordance with manufacturer's installation instructions.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.

- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 - G. Apply cap bead of elastomeric sealant over exposed edge of tape.
- 3.05 GASKET GLAZING (DRY)
- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 - C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - D. Install gaskets so they protrude past face of glazing stops.
- 3.06 CLEANING AND PROTECTION
- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
 - B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
 - C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
 - D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
 - E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass in accordance with glass manufacturer's written instructions.
- 3.07 MONOLITHIC FLOAT-GLASS SCHEDULE
- A. Float-Glass Units: Class 1 (clear); Kind FT (fully float glass (Safety Glass).
 - 1. Thickness: As required to meet Article 2.02 Performance Requirements; 1/4-inch minimum.
 - 2. Tinted to match existing glazing.
- 3.08 LAMINATED GLASS SCHEDULE
- A. Glass Type (Interior Glazing) : Clear laminated glass with two plies of heat-strengthened float glass.
 - 1. Minimum Thickness of Each Glass Ply: 3 mm.
 - 2. Interlayer Thickness: 0.030 inch.
 - 3. Safety glazing required.
 - B. Glass Type (Exterior Glazing) : Tinted, laminated glass with two plies of heat-strengthened float glass.
 - 1. Minimum Thickness of Each Glass Ply: 3 mm, or as required to meet Article 2.02 Performance Requirements;
 - 2. Interlayer Thickness: 0.030 inch.
 - 3. Safety glazing required.

END OF SECTION 08 80 00

SECTION 08 87 53 - SECURITY WINDOW FILM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Safety and security window film.
- B. Film attachment systems.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 - 3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
 - 4. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
 - 5. ASTM D1044 - Standard Method of Test for Resistance of Transparent Plastics to Surface Abrasion (Taber Abrader Test).
 - 6. ASTM D2240 - Standard Method for Rubber Property - Durometer Hardness.
 - 7. ASTM D2582 - Standard Test Method for Puncture-Propagation Tear Resistance of Plastic Film and Thin Sheeting.
 - 8. ASTM D5895 - Standard Test Methods for Evaluating Drying or Curing During Film Formation of Organic Coatings Using Mechanical Recorders.
 - 9. ASTM E84 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- C. Consumer Products Safety Commission 16 CFR, Part 1201 - Safety Standard for Architectural Glazing Materials.
- D. Underwriters Laboratories Inc. (UL): UL 972 - Burglary Resisting Glazing Material.

1.3 PERFORMANCE REQUIREMENTS

- A. Safety Glazing Impact Performance:
 - 1. 400 ft-lbs impact resistance, meeting ANSI Z97.1 (Class A, Unlimited) and 16 CFR 1201 (Category 2) impact requirements with film applied on 1/4 inch annealed glass.
 - 2. Impact Resistance after Aging: 400 ft-lbs, meeting ANSI Z97.1 (Class A, Unlimited) and 16 CFR 1201 (Category 2) impact requirements with film applied on 1/8 inch annealed glass.
 - 3. 400 ft-lbs impact resistance, meeting ANSI Z97.1 (Class A, Unlimited) or 16 CFR 1201 (Category 2) impact requirements with film applied on 1/4 inch annealed glass
- B. Adhesion to Glass:
 - 1. Minimum 2 lbs/in peel strength per ASTM D3330 (Method A).
- C. Flammability: Surface burning characteristics when tested in accordance ASTM E 84, demonstrating film applied to glass rated Class A for Interior Use:
 - 1. Flame Spread Index: no greater than 25.
 - 2. Smoke Developed Index: no greater than 55.
- D. Abrasion Resistance:
 - 1. Film shall have a surface coating that is resistant to abrasion such that less than 5 percent increase of transmitted light haze will result when tested in accordance to ASTM D 1044 using 100 cycles, 500 grams weight, and the CS10F Calibrase Wheel.
- E. UV Light Rejection:
 - 1. Minimum of 99% UV light rejection (300 - 380 nm), per ASTM E903, as determined with film applied on 1/4 inch clear glass.

1.4 SUBMITTALS

- F. Product Data: Manufacturer's current technical literature on each product to be used, including:
 - 1. Manufacturer's Data Sheets.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
- G. 3rd Party Test Report Submittal Requirements. Submit the following 3rd Party test reports indicating compliance with the test values listed in this section.
 - 1. Flammability Testing, ASTM E84.
 - 2. Film Properties Testing, ASTM D882.

3. Abrasion Resistance Testing, ASTM D1044.
4. Peel Strength Testing, ASTM D3330
5. Puncture Strength Testing, ASTM D4830.
6. Safety Glazing Impact Testing, ANSI Z97.1 or 16 CFR 1201.
7. Flammability Testing, ASTM E84.
8. Film Properties Testing, ASTM D882.
9. Abrasion Resistance Testing, ASTM D1044.
10. Peel Strength Testing, ASTM D3330
11. Puncture Strength Testing, ASTM D4830.
12. Burglary Resistance Glazing, UL 972
13. Impact Resistance and Pressure Cycling, ASTMs E1886 and E1996.

H. Product Submittals: 3rd Party test reports from Forced Entry Resistance evaluations.

I. Verification Samples: For each film specified, two samples representing actual film color and pattern.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

1. Provide documentation that the adhesive used on the specified film is a Pressure Sensitive Adhesive (PSA).
2. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
3. Provide documentation that the installer is authorized by the Manufacturer to perform Work specified in this section.
4. Provide a commercial building reference list of 5 installations where the installer has applied window film. This list will include the following information:
 - a. Name and address of building.
 - b. The name and telephone number of a management contact.
 - c. Type of glass.
 - d. Type of film and/or film attachment system.
 - e. Amount of film and/or film attachment system installed.
 - f. Date of completion.
5. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - a. Finish areas designated by Architect.
 - b. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - c. Refinish mock-up area as required to produce acceptable work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Follow Manufacturer's instructions for storage and handling.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of any hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 WARRANTY

- A. At project closeout, provide to Owner's Representative an executed current copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.
- B. In order to validate warranty, installation must be performed by a manufacturer's authorized dealer..

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: 3M Window Film , which is located at: 3M Center Bldg. 0235-02-S-27; St. Paul, MN 55144-1000; Toll

www.3m.com/windowfilm

- B. Acceptable manufacturers subject to compliance with specified products;
 - 1. Llumar
 - 2. Madico, Inc.

2.2 CLEAR SAFETY AND SECURITY WINDOW FILM

- A. 3M Safety S80 (SH8CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
 - 1. Physical / Mechanical Performance Properties:
 - a. Film Color: Clear.
 - b. Thickness: Nominal 8 mils.
 - c. Tensile Strength (ASTM D 882): 25,000 psi.
 - d. Break Strength (ASTM D 882): 200 lbs/in
 - 2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
 - 3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
 - 4. Identification: Labeled as to Manufacturer as listed in this Section.
 - 5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
 - a. Visible Light Transmission (ASTM E 903): 87 percent.
 - b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
 - 6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
 - a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
 - b. Safety Rating (ANSI Z97.1): Class A, Unlimited Size.
- B. 3M Safety S140 (SH14CLARL): Optically clear polyester film with a durable acrylic abrasion resistant coating over one surface and a pressure sensitive adhesive over the other. The adhesive is pressure-activated, not water-activated, and forms a physical bond, not chemical bond, to the glass. The film may be laminated to other clear polyester film layers to achieve the desired thickness of the film.
 - 1. Physical / Mechanical Performance Properties:
 - a. Film Color: Clear.
 - b. Thickness: Nominal 14 mils
 - c. Tensile Strength (ASTM D 882): 25,000 psi.
 - d. Break Strength (ASTM D 882) (Per Inch Width): 350 lbs.
 - 2. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding or other optical defects.
 - 3. Variation in Total Transmission across the Width: Less than 2 percent over the average at any portion along the length.
 - 4. Identification: Labeled as to Manufacturer as listed in this Section.
 - 5. Solar Performance Properties: Film applied to 1/4 Inch (6 mm) thick clear glass.
 - a. Visible Light Transmission (ASTM E 903): 85 percent.
 - b. Ultraviolet Transmission (ASTM E 903): Less than 1 percent.
 - 6. Impact Resistance for Safety Glazing: Tested on 1/4 inch (6 mm) annealed glass.
 - a. Safety Rating (CPSC 16 CFR, Part 1201): Category II (400 ft.-lbs).
 - 7. Impact Resistance and Pressure Cycling:
 - a. Film (14 mil.) shall pass impact of Medium Large Missile "C" and withstand subsequent pressure cycling (per ASTMs E 1996 and E 1886) at +/- 50 psf Design Pressure with use of 3M Impact Protection Adhesive attachment system.
 - 8. Forced Entry Protection: Independent lab testing according to UL 972 protocol (Multiple Impact Test).
 - a. Annealed Glass (1/4 inch) - Pass
 - b. Tempered Glass (1/4 inch) - Pass

2.3 IMPACT PROTECTION FILM ATTACHMENT SYSTEMS

- A. Security Film Attachment System at Storefront Frames: Weatherable rigid PVC secured using structural silicone wet glaze type adhesive attachment to maintain proper alignment and increase the tensile/tear strength of the silicone and provide an aesthetic cover over the silicone bead.
 - 1. Impact Protection Adhesive: Structural Silicone Sealant, Dow Corning 995; Color black.
 - 2. Sealant Cap: BondKap BK 2004, manufactured by FilmFastener LLC, 8206 Copeland Rd., Odessa, FL 33556, telephone 813.926.8721.
- B. Security Film Attachment System at Storefront Doors: Apply film to glass edge at interior side of door glass and apply structural silicone wet glaze type adhesive under stops to secure film to frame and frame to cap/stop.

1. Remove glazing stops on existing doors to receive security film.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Glass surfaces receiving new film should first be examined to verify that they are free from defects and imperfections, which will affect the final appearance.
- B. Do not proceed with installation until glass surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
- C. Commencement of installation constitutes acceptance of conditions.
- D. Impact Protection Adhesive Examination:
 1. Filmed glass surfaces receiving new attachment should first be examined to verify that they are free from defects and imperfections, and that the film edges extend sufficiently to the frame edges.
 2. Do not proceed with installation until film and frame surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
 3. Conduct an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long bead, approximately 0.5 - 1 inch in width, masking one side of the frame surface underneath the strip with tape. Allow the Impact Protection Adhesive to cure for 7 days and test adhesion by pulling up on the masked end and a 90 degree angle. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is not recommended.
- E. Impact Protection Adhesive Examination:
 1. Glass and frames must be examined to ensure that they are fit to receive the impact protection adhesive in a manner such that the two profile adhesive strips will be perpendicularly opposed to each other and that they will not contact glazing stops or frame gaskets without stretching the profile.
 2. Filmed glass surfaces receiving new attachment should first be examined to verify that they are free from defects and imperfections, and that the film edges extend sufficiently to the frame edges.
 3. Do not proceed with installation until film and frame surfaces have been properly prepared and deviations from manufacturer's recommended tolerances are corrected. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result under the project conditions.
 4. Conduct an adhesion test to the frame surface may be conducted by applying a 4 - 6 inch long strip on the frame surface, using the sufficient pressure to achieve good adhesive wet-out. Allow the Impact Protection Profile to cure for 1-2 days and test adhesion by removing the test strip. If cohesive failure is observed (adhesive residue left behind on the frame surface), adhesion is acceptable; if adhesive failure is observed (clean peel from the frame), adhesion is unacceptable and product is either not recommended, or an adhesion promoter, such as 3M Primer 94, must be used.

3.2 PREPARATION

- B. Clean surfaces thoroughly prior to installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. Refer to Manufacturer's installation instructions for methods of preparation for Impact Protection Adhesive or Impact Protection Profile film attachment systems.

3.3 INSTALLATION

- E. Film Installation:
 1. Install in accordance with manufacturer's instructions.
 2. Cut film edges neatly and square at a uniform distance of 1/8 inch (3 mm) to 1/16 inch (1.5 mm) of glass edge. Use new blade tips after 3 to 4 cuts.
 3. Spray the slip solution, composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, on window glass and adhesive to facilitate proper positioning of film.
 4. Apply film to glass and lightly spray film with slip solution.
 5. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
 6. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
 7. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.
- F. Impact Protection Adhesive Installation:

- a. The film attachment system shall be applied according to the specifications of the manufacturer by an authorized dealer/applicator. For impact resistance and building envelope protection:
 - 1) Minimum 1/2 inch bead overlap on both frame and film (excluding glazing stops or compression gaskets).
 - 2. To ensure a straight and consistent bead width is achieved, masking tape may be applied to film and frame surfaces prior to application.
 - 3. Existing compression gaskets may be partially removed or trimmed to allow for a thinner bead and stronger anchorage. If removing the gaskets, sections shall be trimmed approximately 3 inches in length and inserted with appropriate spacing along all sides of the window to help secure the glazing during application and curing of the impact protection adhesive.
 - 4. The impact protection adhesive shall be dispensed with a caulk gun with nozzle opening diameter sized to match the approximate size of the desired bead width.
 - 5. A plastic putty knife or other tool with a clean straight edge shall be used to trowel and smooth out the adhesive. The completed adhesive bead shall be relatively triangular in shape.
 - 6. Any masking tape used shall be carefully removed within 10 minutes after applying the wet glaze.
- G. Impact Protection Cap Installation:
 - 1. The film attachment system shall be applied according to the specifications of the manufacturer by an authorized dealer/applicator trained to install impact protection adhesive system.
 - 2. Each cap piece must span continuously to both sides of the window, within 1/8 inch to the frame edge. Splicing the cap between frame edges is prohibited.
 - 3. Cap must be aligned and applied by manufacturer's recommended or approved methods and tools to ensure a quality installation.
 - 4. Corner joints must be fabricated by manufacturer's recommended and approved methods. No part of the profile adhesive shall make contact with an adjacent profile.
 - 5. Sufficient pressure must be evenly applied along the entire length of the cap to ensure full adhesion . A roller tool is required to minimize entrapment of air in the adhesive.

3.4 CLEANING AND PROTECTION

- A. Remove left over material and debris from Work area. Use necessary means to protect film before, during, and after installation.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. After application of film, wash film using common window cleaning solutions, including ammonia solutions, 30 days after application. Do not use abrasive type cleaning agents and bristle brushes to avoid scratching film. Use synthetic sponges or soft cloths.

END OF SECTION

SECTION 09 05 61.13 - MOISTURE VAPOR EMISSION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.

1.02 DEFINITIONS

- A. MVE: Moisture vapor emission.
- B. MVER: Moisture vapor emission rate.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each MVE-control system, for tests performed by manufacturer and witnessed by a qualified testing agency .
- C. Preinstallation testing reports.
- D. Field quality-control reports.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.
- B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
 1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F and not more than 85 deg F at least 48 hours before use.
 2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F or more than 85 deg F and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
 3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

1.08 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree(s) to repair or replace MVE-Control System that fail(s) in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Delamination of floor coverings due to moisture migration through the applied MVE-control system.
 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
 1. MVER: Maximum 30 lb of water/1000 sq. ft. when tested in accordance with ASTM F1869.
 2. Relative Humidity: Maximum 100 percent when tested in accordance with ASTM F2170 using in situ probes.
- B. Water-Vapor Transmission: Through MVE-control system, maximum 0.05 perm when tested in accordance with ASTM E96/E96M.
- C. Tensile Bond Strength: For MVE-control system, greater than 500 psi with failure in the concrete in accordance with ASTM D7234.

2.02 MVE-CONTROL SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide KOSTER American Corporation; VAP I 2000 UFS or comparable product by one of the following:

1. ARDEX Americas.
2. USG Corporation.
- B. MVE-Control System: ASTM F3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
 1. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
 2. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.
 3. VOC Content: Provide coating with VOC content of 10 g/L or less.
 4. Material Emissions and Pollutant Control: Coating shall comply with either of the following:
 - a. VOC Content: Provide coating with VOC content of 10 g/L or less.
 5. Emissions Requirements: Coating shall comply with either of the following:
 - a. VOC Content: Provide coating with VOC content of 10 g/L or less.

2.03 ACCESSORIES

- A. Patching and Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 4000 psi compressive strength after 28 days when tested in accordance with ASTM C109/C109M.
- B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.
- C. Cementitious Underlayment: Provide MVE-control system manufacturer's hydraulic cement-based underlayment.
 1. Koster LevelStrong Skim Coat SL 282 022.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of system indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Preinstallation Testing:
 1. Testing Agency: Engage a qualified testing agency to perform tests.
 2. Alkalinity Testing: Perform pH testing in accordance with ASTM F710. Install MVE-control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
 3. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Internal Relative Humidity Test: Using in situ probes, ASTM F2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
 4. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100 sq. ft. area of MVE-control system to prepared concrete substrate and test in accordance with ASTM D7234.
 - a. Proceed with installation only where tensile bond strength is greater than 200 psi with failure in the concrete or to 100 percent cohesive failure.
- B. Concrete Substrates: Prepare and clean substrates in accordance with MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
 1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
 2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 3. After shot blasting, repair damaged and deteriorated concrete in accordance with MVE-control system manufacturer's written instructions.
 4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
 5. Fill surface depressions and irregularities with patching and leveling material.
 6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.
 7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.

- 8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.
 - C. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.
- 3.03 INSTALLATION
- A. Install MVE-control system in accordance with ASTM F3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
 - 1. Install primers as required to comply with manufacturer's written instructions.
 - B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.
 - C. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer.
 - D. Cure MVE-control system components in accordance with manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
 - E. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies in accordance with manufacturer's written instructions.
 - F. Install cementitious underlayment over cured membrane in accordance with manufacturer's written instructions.
- 3.04 FIELD QUALITY CONTROL
- A. Testing Agency: Engage a qualified testing agency to perform installation inspections.
 - B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE-control system is installed without deficiencies.
 - 1. Verify that surface preparation complies with requirements.
 - 2. Verify that MVE-control-system film thickness complies with manufacturer's written instructions.
 - 3. Verify that MVE-control-system components and installation areas that evidence deficiencies are repaired in accordance with manufacturer's written instructions.
 - C. MVE-control system will be considered defective if it does not pass inspections.
- 3.05 PROTECTION
- A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.
 - B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION 09 05 61.13

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Non-load-bearing steel framing systems for interior partitions.
 - 2. Suspension systems for interior ceilings and soffits.
- B. Related Sections:
 - 1. Division 05 Section "Cold-Formed Metal Framing" for exterior non-load-bearing wall studs.
 - 2. Division 06 Section "Plastic Laminate-Faced Wood Paneling" for metal wall straps installed behind plastic-laminate faced wall panels.
 - 3. Division 07 Section "Building Insulation" for insulation installed with Z-shaped furring members.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft.

2.02 MATERIALS

- A. Steel: Galvanized Steel meeting or exceeding the requirements of ASTM A 1003.
 - 1. Coating: Galvanized G40 (Z120) coating minimum or equivalent, complying with ASTM C 645.
 - 2. Coating: Galvanized G60 (Z180) coating minimum or equivalent, complying with ASTM C 645.

2.03 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

2.04 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645. Use either steel studs and runners or embossed steel studs and runners.
 - 1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
 - b. Depth: As indicated on Drawings.
 - 2. Embossed Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: 0.0147 inch.
 - b. Depth: As indicated on Drawings.
- C. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.0179 inch.
 - 2. Depth: As indicated on Drawings.
- D. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical or hat shaped.
- E. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
 - 1. Depth: 3/4 inch.
 - 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

- G. Flat Backing Straps for Plastic-Laminate-Faced Wall Panels: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Width: 3 1/2 inches.
 - 2. Minimum Base-Metal Thickness: 0.018 inch.

2.05 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches.
- D. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
 - b. Depth: 1-5/8 inches.
 - 3. Embossed Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0147 inch.
 - b. Depth: 1-5/8 inches.
 - 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
 - 5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- E. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
 - c. United State Gypsum Company; Drywall Suspension System.

2.06 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.03 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.04 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacing indicated, but not greater than spacing required by referenced installation standards for assembly types.
 1. Space studs as follows:
 - a. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
 - b. Multilayer Application: 16 inches o.c., unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 1. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb, minimum 0.0598 inch, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 2. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.05 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Do not attach hangers to steel roof deck.
 5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

- 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board at partitions and ceilings..
- B. Related Sections include the following:
 - 1. Division 05 Section "Cold-Formed Metal Framing" for exterior non-load-bearing steel wall framing that supports gypsum board.
 - 2. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking.
 - 3. Division 06 Section "Sheathing" for gypsum sheathing.
 - 4. Division 07 Section "Thermal Insulation" for insulation installed in assemblies that incorporate gypsum board.
 - 5. Division 09 Section "Non-Structural Steel Framing" for non-structural framing and suspension systems that support gypsum board.
 - 7. Division 09 Section "Painting" for primers applied to gypsum board surfaces.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
 - 2. Textured Finishes: 12 inches by 12 inches for each textured finish indicated and on same backing indicated for Work.

1.04 QUALITY ASSURANCE

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.05 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

2.02 GYPSUM BOARD GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.03 INTERIOR GYPSUM BOARD

- A. General: ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum Co.
 - b. Certain Teed Corp.
 - c. Georgia-Pacific Gypsum, LLC
 - d. National Gypsum Company.
 - e. USG Corporation
- B. Gypsum Wallboard and Ceiling Board.

1. Type X; ASTM C1396 compliant for water resistant gypsum wallboard with moisture and mold resistance.
 2. Thickness:
 - a. Wallboard: 5/8 inch thickness unless otherwise indicated.
 - b. Ceiling board: 5/8 inch thickness unless otherwise indicated.
 3. Long Edges: Tapered.
- 2.04 TILE BACKING PANELS
- A. Cementitious Backer Units (Restrooms, Wet Area Surfaces): ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.
 1. Thickness: 5/8 inch.
 2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- 2.05 TRIM ACCESSORIES
- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
 - B. Aluminum Trim for Accent and Reveals Extruded accessories of profiles and dimensions indicated.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified
 - C. Adjustable Partition Closure:
 1. Manufacturer: Gordon, Inc., Mullion Mate.
 2. Aluminum: Clear anodized finish.
 3. Size: As required to closure between end of partition and interior face of exterior mullion.
 - D. Base Trim: Waterguard Plus, 1 3/4 inch PVC extrusion.
- 2.06 JOINT TREATMENT MATERIALS
- A. General: Comply with ASTM C 475/C 475M.
 - B. Joint Tape:
 1. Interior Gypsum Wallboard: Paper.
 - C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
 - D. Joint Compound for Tile Backing Panels:
 1. Cementitious Backing Board: Use setting-type taping compound and setting-type, sandable topping compound as recommended by panel manufacturer.
- 2.07 AUXILIARY MATERIALS
- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
 - B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR or AIS-919.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.
 - E. Sound Attenuation Blankets: As specified in Section 07 21 00 "Thermal Insulation."
- 2.08 TEXTURE FINISHES
- A. Primer: As recommended by textured finish manufacturer.
 - B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. G-P Gypsum; Georgia-Pacific Ceiling Textures/Vermiculite.
 - b. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
 3. Texture: Light spatter, as approved by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.03 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 1. Type X: Vertical and horizontal surfaces, unless otherwise indicated.
- B. Single-Layer Application:
 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
- 3.04 APPLYING TILE BACKING PANELS
- A. Cementitious Backing Board: Install at wet areas where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
 - B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- 3.05 INSTALLING TRIM ACCESSORIES
- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 - B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
 - C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.
 - 2. Curved-Edge Cornerbead: Use at curved openings.
 - D. Aluminum Trim and Reveals: Install in locations indicated on Drawings.
- 3.06 FINISHING GYPSUM BOARD
- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
 - B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
 - C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
 - D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view and panel surfaces that will receive wall coverings unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
 - 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- 3.07 APPLYING TEXTURE FINISHES
- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
 - B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
 - C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.
- 3.08 PROTECTION
- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
 - B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 30 13 – CERAMIC TILING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Glazed wall tile.
 - 2. Floor tile and base
 - 3. Crack-suppression membrane for thin-set tile installations.
- B. Related Sections include the following:
 - 1. Division 07 Section “Joint Sealants”
 - 2. Division 09 Section “Gypsum Board Assemblies”

1.02 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated. Include written instruction's for using adhesives and grouts.
- B. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes as part of Close-Out Documents.
- E. Samples: Provide as may be requested by Architect.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each product specified in this section from a single source manufacturer of that product.
 - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Conform to Tile Council of America Handbook.
- C. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience
- D. Installer: Company specializing in performing the work of this section with minimum 3 years documented experience approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A 137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store adhesives in unopened containers and protect from freezing or overheating.
- D. Handle tile that has temporary protective coatings on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.07 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective coverings for storage and identified with labels describing contents.
 - 1. Provide 25 sq. ft. of each size, color, and surface finish of tile specified.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers for ceramic tile.
 - 1. Daltile

2.02 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, “Specification for Ceramic Tile,” for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- 2.03 TILE PRODUCTS
- A. Ceramic FloorTile (F-4): Colorbody Porcelain, Daltile Fabrique, conforming to the following:
1. Moisture Absorption: 0 to 0.5%
 2. Size: 12 x 24 x 5/16 inches
 3. Shape: Rectangular
 4. Edge: Cushion
 5. Surface Finish: matt and gloss
 6. Color and Pattern: As scheduled on the Drawings
 - a. Base: Surface bullnose top edge, face size 4 by 12 inches.
- A. Ceramic Wall Tile (CT-1) ANSI A137.1, Colorbody Porcelain, Daltile Fabrique, conforming to the following:
1. Moisture Absorption: 0 to 0.5%
 2. Size: 12 x 24 x 5/16 inches
 3. Shape: Rectangular
 4. Edge: Cushion
 5. Surface Finish: matt and gloss
 6. Color and Pattern: As scheduled on the Drawings
- B. Ceramic Wall Tile (CT-1A) ANSI A137.1, Mosaic Keystones, Daltile, conforming to the following:
1. Moisture Absorption: 0 to 0.5%
 2. Size: 1 x 1 x ¼ inches
 3. Shape: Square
 4. Edge: Cushion
 5. Surface Finish: glazed
 6. Color and Pattern: As scheduled on the Drawings
- C. Ceramic Wall Tile (CT-1B) ANSI A137.1, Daltile Electric Petal, conforming to the following:
1. Moisture Absorption: 0 to 0.5%
 2. Size: 6 x 6 inches
 2. Shape: Square
 3. Edge: Cushion
 4. Surface Finish: Glazed (semi-gloss)
 5. Color and Pattern: As scheduled on the Drawings
- 2.04 SETTING AND GROUTING MATERIALS
- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work.
1. Laticrete
 2. Mapei
- B. Modified Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, white, consisting of the following:
1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
 2. Prepackaged dry-mortar mix combined with liquid-latex additive.
- C. Adhesive Materials: Multi-purpose Adhesive: ANSI A136.1, Type 1.
- D. Cementitious Grout: Standard Sanded Cement Grout: ANSI A118.6, color as indicated.
- 2.05 ELASTOMERIC SEALANT
- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A and as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
1. Products:
 - a. Dow Corning Corporation; Dow Corning 786
 - b. GE Silicones; Sanitary 1700

- c. Pecora Corp.; Pecora 898 Sanitary Silicone Sealant
- D. Multipart, Pourable Urethane Sealant for Use T: ASTM C920; Type M; Grade P; Class 25; Uses T, M, A and as applicable to joint substrates indicated.
 - 1. Products:
 - a. Bostik; Chem-Calk 550
 - b. Pecora Corporation; NR-200 Urexpan
 - c. Tremco, Inc.; THC-900

2.06 METAL PROFILE STRIPS

- A. Wall Tile:
 - 1. RONDEC manufactured by Schluter Systems.
 - 2. Description: Bullnose-type profile with symmetrically rounded visible surface with 1/4-inch radius, integrated trapezoid perforated anchoring leg and integrated grout joint spacer; height to match tile and setting bed thickness.
 - 3. Components: Matching inside and outside corners and internal connectors.

2.07 MISCELLANEOUS MATERIALS

- A. Waterproofing and Crack-Suppression Membranes for Thin-Set Tile Installations: Manufacturer's standard product that complies with ANSI A118.10, selected from the following.
 - 1. Fabric-Reinforced, Fluid-Applied Product: Liquid-latex rubber, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24),] with fabric reinforcement.
 - 2. Available Products:
 - a. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane.
 - b. MAPEI Corporation; PRP M19.
 - c. Summitville Tiles, Inc.; S-9000.
- B. Trowelable Underlayments and Patching Compounds; Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials
- C.. Tile Cleaner: A neutral cleaner capable of removing sol and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufactures.

2.08 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturer's written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Provide concrete substrates for tile floors installed with thin-set mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.

1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting manufacturer.
 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within ranges selected, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages. If not blended return tile or blend on site prior to installation.
- 3.03 INSTALLATION, GENERAL
- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
 - B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
 - C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
 - E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, as recommended by TCA and where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Install expansion joints in tile at all concrete cold joints and sawcut control joints. Keep joints free of adhesive or grout. Apply rod and sealant to joints.
 3. At locations where tile work joints being located over substrate joints affect tile pattern, provide a chlorinated polyethylene composite sheet.
 - a. Install over substrate joint in strict accordance with manufacture's written instructions.
 - b. Size sheet and provide bond coat material as recommended by manufacturer.
 - c. Provide soft joint each side of substrate joint at closest tile joint. Soft joint must equal width of substrate joint.
 - G. Allow tile to set for a minimum of 48 hours prior to grouting. Grout tile to comply with ANSI A108.10 and TCA recommendations.
 - H. Apply sealant joint to junction of tile and dissimilar materials and junction of dissimilar planes.
 - I. Apply sealant joint to all inside corners, joints at floor and wall tile and perimeter of door frames.
- 3.04 WATERPROOF AND CRACK-SUPPRESSION MEMBRANE INSTALLATION
- A. Install waterproofing to comply with ANSI A108 and membrane manufacturer's written instructions.
 - B. Install crack-suppression membrane to comply with manufacturer's written instructions.
- 3.05 FLOOR TILE INSTALLATION
- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation method and ANSI A108 Series of tile installation.
 - B. Interior floor installation on crack-suppression membrane over concrete; thin-set mortar; TCA F131.
 1. Thin-Set Mortar: Epoxy mortar ANSI A118.3
 2. Grout: Epoxy grout ANSI A118.3
- 3.06 WALL TILE INSTALLATION
- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed

- standards.
 - B. Joint Widths: Install tile on walls with the following joint widths:
 - 1. Glazed Wall Tile: 1/16"
 - C. Install tile in patterns as indicated in the Drawings.
- 3.07 CLEANING AND PROTECTING
- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. If applicable, remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
 - B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to cleaner to completed tile walls and floors. Protect installed tile work during construction period to prevent staining, damage and wear.
 - C. Prohibit foot and wheel traffic from tiled floors for at least seven (7) days after grouting is completed.
 - D. Before final inspection, remove protective coverings and rinse neutral cleaner, if applicable, from tile surfaces.
- 3.08 WALL TILE INSTALLATION SCHEDULE
- A. Tile Installation: In interior wall installation over glass-mat, water-resistant backer board TCA Handbook Number W245-17.
 - 1. Cementitious Bond Coat: ANSI 118.4
 - 2. Epoxy Grout: ANSI 118.3
 - B. Tile Installation: Interior wall installation over masonry; TCA Handbook Number W223-17.
 - 1. Organic Adhesive Bond Coat: ANSI A136.1
 - 2. Epoxy Grout: ANSI A108.6

END OF SECTION 09 30 13

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.02 SUMMARY

- A. This section includes the following:
 - 1. Suspended grid ceiling system and perimeter trim
 - 2. Acoustic ceiling panels
- B. Related Sections include the following:
 - 1. Division 23 for Air Devices: Air diffuser devices in ceiling systems.
 - 2. Division 26 for Lighting: Light fixtures in ceiling system
 - 3. Division 28 for Fire Alarm System: Fire Alarm components in ceiling system.

1.03 SYSTEM DESCRIPTION

- A. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1:360.

1.04 SUBMITTALS FOR REVIEW

- A. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelation of mechanical and electrical items related to system.
- B. Product Data: Provide data on metal grid system components and acoustic units.
- C. Samples: Submit two samples, 6"x6" in size, illustrating material and finish of acoustic units.
- D. Samples: Submit two samples each, 6" long, of suspension system main runner, cross runner, and edge trim.

1.05 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.

1.06 REGULATORY REQUIREMENTS

- A. Conform to local Building Code for fire rated assembly and combustibility requirements for materials.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60°F and maximum humidity of 40% prior to, during, and after acoustic unit installation.

1.09 PROJECT CONDITIONS

- A. Sequence work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustic units after interior wet work is dry. Maintain uniform temperature of minimum 60°F and maximum humidity of 40% prior to, during, and after acoustic unit installation.

1.10 EXTRA MATERIALS

- A. Provide to Owner, for each type of panel, one case of extra tile.

PART 2 - PRODUCTS

2.01 SUSPENSION SYSTEM MATERIALS

- A. Manufacturers:
 - 1. Armstrong World Industries
 - 2. Certain Teed Corp.

- 3. Chicago Metallic Corp.
 - 4. USG Interiors Inc.
 - B. Products: Basis of design product, Armstrong Prelude XL Exposed Tee System
 - 1. Steel Cap Steel Grid: ASTM C635, intermediate duty, exposed T; components die cut and interlocking
 - 2. Exposed Grid Surface Width: 15/16"
 - 3. Grid Finish: White unless indicated otherwise on finish/color schedule.
 - C. Accessories: Stabilizer bars, clips, splices, perimeter moldings, and hold down clips required for suspended grid system.
 - D. Edge molding: Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - E. Flex Molding: Armstrong Shadow Molding Item 7890.
 - 1. 3/4-inch steel base with flexible vinyl facing for finishing circular columns and curved wall surfaces at suspended ceiling systems.
 - F. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
 - G. Suspension system capable of supporting additional weight of acoustical insulation installed over ceiling panels.
- 2.02 ACOUSTIC UNIT MATERIALS
- A. Manufacturers
 - 1. Armstrong World Industries Inc.
 - 2. Certain Teed Corp.
 - 3. USG Interiors Inc.
 - B. Acoustic Ceiling Panels
 - 1. C-1, C-1A, C-1B: Basis of design product, Armstrong Ultima 1940, conforming to the following:
 - a. Surface Texture: Smooth, unperforated.
 - b. Composition: Mineral Fiber.
 - c. Color: C-1: White.
 - d. Size:
 - 1) 24 inches by 24 inches; 15/16 inches thick.
 - 2) 24 inches by 48 inches; 15/16 inches thick where indicated on Drawings.
 - e. Edge Profile: Square Lay-In for interface with compatible Armstrong grid.
 - f. NRC: 0.80.
 - g. Flame Spread: ASTM E 1264; Class A (UL)
 - h. Light Reflectance (LR): ASTM E 1477; White Panel Light Reflectance: 0.87
 - i. Dimensional Stability: HumiGuard Plus, temperatures up to 120 degrees F and high humidity.
 - j. Mold/Mildew Inhibitor: Front and back surfaces treated with BioBlock paint to inhibit and retard mold and mildew growth, ASTM D 3273.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify work of other work is complete and ready for work of this Section to commence.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - LAY-IN SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636 and as supplemented in this section.
- B. Install system capable of supporting imposed loads to a deflection of 1/360 maximum.
- C. Lay out system to a balanced grid design with edge units no less than 50% of acoustic unit size.
- D. Locate system on room axis according to reflected ceiling plan.
- E. Install after major above ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hang suspension system independent of walls, columns, ducts, pipes, and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, provide back to back carrying channels meeting the assembly requirements to span the extra distance.

- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
 - I. Support fixture loads by supplementary hangers located at each corner.
 - J. Do not eccentrically load system, or produce rotation of runners.
 - K. Install perimeter edge trim at intersection of ceiling and vertical surfaces using longest practical lengths; miter corners. Provide edge trim at junctions with other interruptions.
 - L. Install all hanger wires for suspension system straight up and down; provide intermediate supports between structural members as required. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means in accordance with ASTM C 636.
- 3.03 INSTALLATION - ACOUSTIC PANEL UNITS
- A. Install acoustic units in accordance with manufacturer's written instructions.
 - B. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
 - C. Install units after above ceiling work is complete.
 - D. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
 - E. Cut acoustic units to fit irregular grid and perimeter edge trim.
 - F. Where round obstructions occur, provide preformed closures to match perimeter molding.
 - G. Install retention clips at gymnasium ceiling: 2 per panel.
- 3.04 ERECTION TOLERANCES
- A. Maximum Variation from Flat and Level Surface: 1/8" in 10'
 - B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2°.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.
- B. Related Sections:
 - 1. Division 09 Section "Resilient Tile Flooring" for resilient sheet floor coverings.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.03 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.05 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 90 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 90 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.06 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.01 RESILIENT BASE

- A. Thermoset-Rubber Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by Tarkett-Johnsonite, or one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Roppe
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style and Location:
 - a. Cove (base with toe) at resilient floors;
 - b. Straight (flat or toeless) at carpet floors.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches, or as indicated on Drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed.
- H. Finish: As selected by Architect from manufacturer's full range.
- I. Colors and Patterns: As indicated by manufacturer's designations.

2.02 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Roppe Corporation, USA.
 - B. Description: Carpet edge for glue-down applications; Nosing for carpet; Reducer strip for resilient floor covering ;Joiner for tile and carpet Transition strips.
 - C. Material: Rubber.
 - D. Profile and Dimensions: As indicated.
 - E. Colors and Patterns: As indicated by manufacturer's designations.
- 2.03 INSTALLATION MATERIALS
- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 - B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 1. Inside Corners: Use straight pieces of maximum lengths possible.

3.04 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.

2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19.13 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.02 SUMMARY

- A. Section includes the following products:
 - 1. Resilient tile flooring, full spread adhesive method installation over moisture mitigation membrane.
 - 2. Accessories as required for complete installation of flooring.
 - 3. Substrate preparation and moisture mitigation.
- B. Related Sections:
 - 1. Section 09 05 61.13 – Moisture Vapor Emission Control.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, and colors available.
- B. Samples: Submit two samples, 4"x4" in size illustrating color and pattern for each floor material for each color specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- D. Maintenance Data: Include as part of Close-Out documents, maintenance materials, recommended procedures and schedule for cleaning. Include precautions against cleaning materials and methods detrimental to finishes and performance.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall be certified by manufacturer to perform work of this section.
- B. Regulatory Requirements: Resilient Tile Flooring shall contain the following Fire Performance Characteristics:
 - 1. Critical Radian Flux: Class 1 Rating per NFPA 253 (ASTM 648) (0.45 watts/square cm or greater).
 - 2. Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store floor tile and installation materials in dry spaces protected from the weather, at ambient temperature and humidity conditions as recommended by manufacturer prior to and after installation. Store floor tiles on flat surfaces.

1.06 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, 68 deg F for 72 hrs. prior to, during and after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation, or for time interval as recommended by manufacturer.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.07 EXTRA MATERIALS

- A. Provide one unopened box of each color and or texture of flooring material installed.

1.08 WARRANTY

- A. Manufacturer's Warranty: As part of closeout documents, provide manufacture's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 - 1. Warranty Period: Twenty (20) year limited warranty commencing upon date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by manufacturer specified :
 - 1. HMTX Commercial

2.02 RESILIENT TILE

- A. Tile (F-2, F-2A): Solid Vinyl Tile/LVT: Patcraft 1509V Mark Making:
 - 1. Size: 6 " by 48".plank
 - 2. Gauge: 20 mil
 - 3. 22 mil wear layer.
 - 4. Square edges.
 - 5. Flammability: ASTM E648, Class 1.
 - 6. Pattern(s) and Color(s): As indicated on the Drawings.

2.03 INSTALLATION MATERIALS

- A. Membrane Forming Moisture Mitigation System: See Section 09 05 61.13 – Moisture Vapor Emissions Control.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 - 1. Ardex Feather Finish – Self-drying, cement-based finishing underlayment.
- B. Adhesive: Lokworx 4200 Resilient Adhesive, 99% RH moisture substrate adhesive.
- C. Reducer Strip: Provide at transitions between dissimilar materials. Color as selected by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Concrete substrates must be not less than 60 days old.
 - 2. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 3. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing. Follow manufacturer's requirements for moisture testing.
- C. Concrete pH Test: Perform pH tests on concrete floors regardless of the age. If the pH is greater than 12 or less 7.0, will require remediation prior to installation.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device. Retain first paragraph below for tile installed on covers.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters. Revise first paragraph below if other-than-full-spread adhesive method is recommended by manufacturer for substrate and tile products selected.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

1. Use adhesive applied to substrate in compliance with flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing, and adhesive open and working times.

3.04 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil. Do not wash floor until after time period recommended by tile flooring manufacturer.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 19.13

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes
 - 1. Modular, tufted textured loop carpet tile.
 - 2. Sealing new concrete floor surface to receive carpet
- B. Related Sections include the following:
 - 1. Division 09 Section "Resilient Base" for resilient wall base and accessories installed with carpet tile.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.
- E. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.
- F. Warranty: Special warranty specified in this Section.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.04 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
 - 3. Warranty Period: 15 years from date of Substantial Completion.

1.05 MATERIALS FURNISHED TO OWNER

- A. Furnish materials described below, that match products selected and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.01 CARPET TILE

- A. Carpet Tile F-1: Tarkett Commercial Modular, 11661 Sky Atlas
 - 1. Platform Size: 24"x24"
 - 2. Fiber Type: DynexSD Nylon
 - 3. Construction: Patterned loop.
 - 4. Gauge: 5/64 in
 - 5. Pile Thickness: 0.085 inch
 - 6. Backing System: Modular Ethos
 - 7. Applied Soil-Resistance Treatment: ENSURE.

- 8. Color: See Drawings Finish Schedule
- B. Carpet Tile F-12: Tarkett Commercial Modular, 02578 Abrasive Action II.
 - 1. Platform Size: 24"x24"
 - 2. Fiber Type: TDX Nylon
 - 3. Construction: Patterned loop
 - 4. Gauge: 1/12 in
 - 5. Pile Thickness: 0.115 inch
 - 6. Backing System: Modular Ethos
 - 7. Applied Soil-Resistance Treatment: ENSURE.
 - 8. Color: See Drawings Finish Schedule

2.02 PERFORMANCE CHARACTERISTICS

- A. Performance Characteristics:
 - 1. Radiant Panel: (ASTM E-648) Class 1
 - 2. Smoke Density: (ASTM E - 662) ≤ 450
 - 3. Lightfastness: (AATCC 16 - E) $\geq 4.0 @ 60$ AFU's
 - 4. Static: (AATCC - 134) < 3.0 KV Tuft Bind: Not less than 10 lbf per ASTM D 1335.
 - 6. Delamination: Not less than 4 lbf/in. per ASTM D 3936.
 - 7. Dimensional Tolerance: Within 1/32 inch of specified size dimensions, as determined by physical measurement.
 - 8. Dimensional Stability: 0.2 percent or less per ISO 2551 (Aachen Test).
 - 9. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
 - 10. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) per AATCC 16, Option E.
 - 11. VOC Limits: Provide carpet tile that complies with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Total VOCs: 0.5 mg/sq. m x h.
 - b. 4-PC (4-Phenylcyclohexene): 0.05 mg/sq. m x h.
 - c. Formaldehyde: 0.05 mg/sq. m x h.
 - d. Styrene: 0.4 mg/sq. m x h.

2.03 INSTALLATION ACCESSORIES

- A. Resilient Transitional Moulding: Tandus Centiva MetalEdge, homogenous composition of polyvinyl chloride (PVC) to transition between adjacent floor finishes of different thickness.
 - 1. Styles ME001, ME002 or ME003 as required by thickness of adjacent floor finishes.
 - 2. Comply with ADA Section 4.5.2 .
- B. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- C. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. VOC Limits: Provide adhesives that comply with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Total VOCs: 10.00 mg/sq. m x h.
 - b. Formaldehyde: 0.05 mg/sq. m x h.
 - c. 2-Ethyl-1-Hexanol: 3.00 mg/sq. m x h.
- D. Epoxy Sealer: Manufacturer's recommended epoxy coating seal to reduce moisture vapor emissions in concrete floor slabs to acceptable limits for installation of carpet tiles.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation. Apply epoxy sealing material to surface of concrete slabs to reduce moisture vapor emission to manufacturer's approved limits. Install in accordance with sealer manufacturer's written installation instructions.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Perform moisture testing as recommended by manufacturer. Proceed with installation only after substrates have been tested and meet the minimum requirements from the manufacturer in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- F. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.03 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.04 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 09 72 00 – WALL COVERINGS

PART 1 - GENERAL

1.2 SUMMARY

- A. Section includes:
 - 4. Accessories for installation of wallcovering.

1.3 QUALITY ASSURANCE

- A. Qualifications of Installers:
 - 1. For actual cutting and installation of vinyl wallcovering, use only thoroughly trained and experienced installers completely familiar with the installation recommendations of the manufacturer of the wallcovering used and completely familiar with the requirements of this work.
 - 2. In acceptance or rejection of installed wallcovering, no allowance will be made for lack of skill on the part of installers.
- B. Manufacturer's Recommendations: The installation of the wallcovering used shall be in accordance with product manufacturer's recommendations.

1.4 SUBMITTALS

- A. Samples: Before delivery of any wall covering to the job site, submit to the Architect samples of the full range of colors and patterns of wall covering in the quality of type specified.
- B. Manufacturer's Recommendations: Accompanying the Samples, submit to the Architect a minimum of two copies of the manufacturer's current installation recommendations for the material to be installed under this section.
- C. Maintenance Data: Submit as part of the Close-Out documents, the vinyl wall covering manufacturer's printed instructions for maintenance of the installed work.
 - 1. Include name of manufacturer, material brand name, color and texture designation, and precautions for the use of cleaning materials and methods which could damage the wall covering.

1.5 PRODUCT, DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Comply with manufacturer's written instructions and recommendations and as herein specified.
 - 1. Deliver materials to the project site in original packages or containers clearly labeled to identify manufacturer, brand name, quality or grade, and fire hazard classification when applicable.
 - 2. Store materials in original undamaged packages or containers. Do not store vinyl wallcovering fabric in an upright position.
 - 3. Maintain temperature in storage area above 40°F, and not less than 65°F, for at least 24 hours before installation.
- B. Protection: Protect vinyl wallcovering materials before, during, and after installation from work of other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to Owner.

1.6 EXTRA MATERIALS

- A. Provide a minimum of one half roll of wallcovering of each type, color, and pattern specified.

PART 2 – PRODUCTS

2.1 VINYL WALLCOVERING

- A. Wallcovering WC-1: Momentum Textiles, Tonality
 - 1. Series: See Finish Schedule on Drawings.
 - 2. Type II, W-101, FS CCC-W-408A/D
 - 3. Weight: 20 oz.
 - 4. Width: 52/54"
 - 5. Backing: Non-woven, 50% post-consumer recycled content
 - 6. Content: 100% Vinyl
 - 7. Installation: Non-reverse hang, random match,
 - 8. Fire Classification: ASTM E-84 Class A; NFPA 286
 - 9. Pattern/ Color: Indicated on Drawings
- B. Wallcovering WC-1A, WC-1B, WC-1D: Momentum Textiles, Lural Leaf
 - 1. Series: See Finish Schedule on Drawings.
 - 2. Type II, W-101, FS CCC-W-408A/D
 - 3. Weight: 20 oz.
 - 4. Width: 52/54"

5. Backing: Non-woven, 50% post-consumer recycled content
 6. Content: 100% Vinyl
 7. Installation: Non-reverse hang, random match,
 8. Fire Classification: ASTM E-84 Class A; NFPA 286
 9. Pattern/ Color: Indicated on Drawings
- C. Wallcovering WC-1C: Momentum Textiles, Roanoke
1. Series: See Finish Schedule on Drawings.
 2. High durability, CCC-W-408D and w-101
 3. Weight: 20 oz.
 4. Width: 54"
 5. Backing: Osnaburg
 6. Content: 100% Vinyl
 7. Installation: Reverse hang, random match.
 8. Fire Classification: ASTM E-84 Class A.
 9. Pattern/ Color: Indicated on Drawings
- D. Wallcovering WC-2: Momentum Textiles, NuFelt Concentric
1. Series: See Finish Schedule on Drawings.
 2. Description: Acoustical/tackable.
 3. Weight: 25 oz.
 4. Width: 56"
 5. Thickness: 1/8"
 6. Backing: Fused polyester
 7. Content: 100% recycled polyester
 8. Installation: Non-reverse hang, straight across match.
 9. Fire Classification: ASTM E-84 Class A.
 10. Acoustical Value: NRC 0.15
 11. Pattern/ Color: Indicated on Drawings

2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.
 1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Primer/Sealer: Mildew resistant, white alkyd enamel undercoat complying with requirements recommended in writing by wall-covering manufacturer for intended substrate.
- C. Provide all joint edge moldings, accessories, color matched caulk, etc., as required for proper installation.
- D. Trim at tackable wall covering: Termination J-cap, anodized aluminum finish TR-2, Schluter Model Q100ACG.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and installation conditions to ensure surface conditions meet or exceed a Level 4 finish, per GA-214-M-97: Recommended Levels of Gypsum Board Finish, and permanent lighting should be installed and operational.
- B. Test substrate with a suitable moisture meter and verify that moisture content does not exceed four percent.
- C. Verify substrate surface is clean, dry, smooth, structurally sound, and free from surface defects and imperfections that would show through the finished surface.
- D. Evaluate all painted surfaces for the possibility of pigment bleed-through.
- E. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.
- F. Beginning of installation means acceptance of surface conditions.

3.2 INSTALLATION

- A. Preparation: Prepare and prime the wall surfaces in strict accordance with the manufacturer's recommendations.
 1. Float wall surface to receive dry-erase wallcovering and sand to smooth, even surface.
- B. Prior to installation of all wallcovering, the Contractor shall contact the manufacturer's local technical representative and set up a pre-installation coordination meeting with the Installer, Contractor, Owner, and Architect to review

installation requirements and procedures. Meeting shall occur one week prior to start of installation. The technical representative shall also be called out to the job site to monitor the first day of installation.

C. Installation:

1. Spread the adhesive and hang the wallcovering, both in strict accordance with the manufacturer's written recommendations and technical representatives instructions.
2. Butt all seams; do not overlap.
3. If defective material is discovered in the bolt, discard the defective portions.
4. Properly match all patterns and achieve a uniformly smooth finished surface, completely free from wrinkles and with all wall covering firmly attached to the substrate.
5. Tape and float flanges of aluminum j-trim at perimeter of dry erase surface; sand floated surface to provide smooth finish.

3.3 CLEANING UP

- A. After installation of wallcovering, immediately clean all surfaces, removing all traces of adhesive and soil, thoroughly washing with clean water. Do not use carbon tetrachloride, cleaning solvents, or any other cleaning agent not specifically recommended by the manufacturer of the wall covering.

END OF SECTION 09 72 00

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces. (Note: Not all applications or systems indicated herein apply to work of this project. Refer to drawings for limits of work.)
 - 1. Exposed exterior items and surfaces.
 - 2. Exposed interior items and surfaces.
 - 3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
 - 2. Painting includes identifying fire-rated wall assemblies with stenciled lettering above ceiling.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Finished mechanical and electrical equipment.
 - b. Light fixtures.
 - c. Prefinished metals as indicated on the drawings. (Factory Primed or Galvanized finishes do not constitute a prefinished metal.)
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Ceiling plenums.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Prefinished (factory color coated finish) over galvanized steel.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
 - 5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry" for surface preparation of concrete masonry units.
 - 2. Division 05 Section "Structural Steel" for shop priming structural steel.
 - 3. Division 05 Section "Metal Fabrications" for shop priming ferrous metal.
 - 4. Division 08 Section "Steel Doors and Frames" for factory priming steel doors and frames.
 - 5. Division 09 Section "Gypsum Board Assemblies" for surface preparation of gypsum board.

1.02 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.03 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

- 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
 - B. Field Samples for Verification: For each color and material to be applied, with texture to match actual conditions.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Continue field samples until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 - 3. Submit samples on actual substrates for review of color and texture only if requested by Architect.
 - C. Qualification Data: For Applicator.
- 1.04 QUALITY ASSURANCE
- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 - B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.
- 1.05 DELIVERY, STORAGE, AND HANDLING
- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
 - B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and application.
- 1.06 PROJECT CONDITIONS
- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
 - B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
 - C. Do not apply paint in rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.
 - 2. Provide lighting level of 80 footcandles measured at mid-height of substrate surface.
- 1.07 EXTRA MATERIALS
- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents and mix formula. Deliver extra materials to Owner.
 - 1. Quantity: Furnish Owner with extra paint materials in quantities indicated below:
 - a. Provide one gallon of each color, type and texture applied on the project.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Products: Subject to compliance with requirements, provide products listed in the paint schedule from one of the following manufactures.
- B. Manufacturers:
 - 1. Sherwin-Williams Co.

2.02 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Clean new or previously painted substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants. Patch and repair existing surfaces prior to painting.
 - 2. Provide barrier coats over incompatible primers or remove and reprime.
 - 3. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - 4. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with Steel Structure Painting Council's (SSPC) recommendations.
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

6. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. Provide finish coats that are compatible with intumescent fireproofing on structural steel.
 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convactor covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 7. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 9. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 10. Sand lightly between each succeeding enamel or varnish coat.
 11. Plastic laminate faced doors; prime tops and bottoms with gloss varnish.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required. Confirm use of spray equipment is acceptable to Owner.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
1. Piping, Pipe hangers, brackets and supports.
 2. Tanks that do not have factory-applied final finishes.
 3. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 4. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 5. Equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
 2. Panelboards.
 3. Electrical equipment that is indicated to have a factory-primed finish for field painting.
 4. Paint exposed conduit and electrical equipment occurring in finished areas. Color and texture to match adjacent surfaces.
 5. Paint faces and edges of plywood backboards for electrical equipment before installing backboards and mounting equipment on them.
- H. At all rated walls, stencil "FIRE/SMOKE WALL – DO NOT PENETRATE" in 2" high Helvetica letters using red paint. Stencil on each side of wall above ceiling line at 25' on center.
- I. Do not bridge openings of CMU sound block.
- J. All exposed gypsum board walls shall receive a medium rolled on orange peel finish texture.
1. Areas to receive graphics will be smooth texture finish.
 2. At textured walls, texture is to be continuous to edge of door and window frames and all corners.
- K. All finishes that have been touched-up and do not blend without visible evidence will require repainting of the entire wall or surface.
- L. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- M. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- N. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- O. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.
- P. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- Q. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.05 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.06 PAINT SCHEDULE

- A. The following specifications for materials and finishes are not intended to mention every particular item which will receive painter's finish but is intended to establish type and quality of finish which will be required on various materials.
- B. Paint brand (Sherwin Williams) and types listed below are for indication of quality of material required. Substitutions of equal products by one of the listed manufacturers may be made.
- C. Selected colors for painted surfaces are indicated on the Drawings.
- D. Apply the following finishes to the designated areas. Paint products and numbers indicated are for Sherwin Williams Paint unless indicated otherwise. (NOTE: All finish types may not be required in this project).

INTERIOR PAINT SYSTEMS

DRY MIL THICKNESS

01.	System Type 2 - Exposed Steel, Galvanized Metal, Metal Doors and Frames (Ferrous)	
	1st Coat: Pro-Cryl Universal Primer – B66-310	3.0
	2nd Coat: ProClassic Acrylic Waterborne Semi-Gloss Enamel	2.0
	3rd Coat: Same as 2nd Coat	2.0

02.	System Type 4 - Gypsum Board: Scheduled Walls & Ceilings	
	1st Coat: Prep Rite Hi-Build Primer /Surfacer- B28W200	1.2
	2nd Coat: ProMar 200 Interior Latex Eg-shel – B20-600 Series	2.0
	3rd Coat: Same as 2nd Coat	2.0
03.	System Type 5 - Sealed Concrete Floors (non-painted)	
	1st Coat: Armorseal Rexithane I Floor Coating (clear)	1.5
	2nd Coat: Same as 1st Coat	1.5
	Apply 1st and 2nd coats when all trades are completed and structure is ready for occupancy. Surface must be free of dust, dirt, and other foreign matter.	
04	System Type 6 - Gypsum Board: Epoxy Finish at Scheduled Walls & Ceilings	
	1st Coat: Prep Rite High Build Primer/Surfacer - B28W601	1.3
	2nd Coat: Waterbased Tile Clad Epoxy – B73-100	4.0
	3rd Coat: Same as 2nd Coat	4.0
05.	System Type 10 - Galvanized Metal, Zinc Coated Metal	
	1st Coat: Pro Cryl Universal Primer B66-310	1.5
	2nd Coat: ProClassic Acrylic Waterborne Enamel	2.5
	3rd Coat: Same as 2nd Coat	2.5
06.	System Type 13 - CMU Wall Epoxy Finish	
	1 st Coat: Loxon Block Surfacer – A24W200	8.0
	2 nd Coat: Water Based Epoxy – B70 Series	3.0
	3 rd Coat: Same as 2 nd Coat	3.0

EXTERIOR PAINT SYSTEMS

DRY MIL THICKNESS

01.	System Type 18 - Galvanized Metal, Metal Doors and Frames	
	1st Coat: Pro Cryl Universal Primer	2.0
	2nd Coat: Steel Master 9500 Silicone Alkyd B56-300	2.0
	3rd Coat: Same as 2nd Coat	2.0
02.	System Type 20 - Exposed Mechanical Equipment Cabinets	
	1st Coat: Macropoxy HS B62-110 Series	10.0
	2nd Coat: Fast Clad Urethane B65-850	6.0 - 9.0
03.	System Type 21 - Pavement Marking (Refer to Division 32 Sections for Traffic Paint Striping)	

END OF SECTION 09 91 00

SECTION 10 11 00 - VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Markerboard assemblies.
 - 2. Tackboard assemblies.
 - 3. Marker Wall and Tack Wall Assemblies.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for support blocking concealed in wall cavity.

1.02 DEFINITIONS

- A. Tackboard: Framed tackable surface.
- B. Visual Display Boards: Markerboards, tackboards and tackstrips.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show location of panel joints.
 - 2. Include sections of typical trim members.
- C. Samples for Verification: For each type of visual display surface indicated and as follows:
 - 1. Visual Display Surface: Not less than 8-1/2 by 11 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch- long sections of each trim profile.
 - 3. Accessories: Full-size Sample of each type of accessory.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for surface-burning characteristics of fabrics.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For visual display surfaces to include in maintenance manuals.
- G. Warranties: Special warranties specified in this Section.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of visual display surface through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide fabrics with the surface-burning characteristics indicated, as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.
- B. Store visual display units vertically with packing materials between each unit.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating visual display surfaces without field measurements. Coordinate wall construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.07 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces become slick or shiny.
 - c. Surfaces exhibit crazing, cracking, or flaking.
 - 2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Product: Subject to compliance with requirements, provide product specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 MATERIALS, GENERAL

- A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
- B. Hardboard: AHA A135.4, tempered.
- C. Cork Sheet: MS MIL-C-15116-C, Type II.
- D. Natural Cork Sheet: Seamless, single layer, compressed fine-grain cork sheet, bulletin board quality; face sanded for natural finish.
- E. Fabric: 100% polyester fabric, ASTM-E-84, Flame Tunnel Test Class "A" Rating.
- F. Extruded Aluminum: ASTM B 221, Alloy 6063.
- G. High-Pressure Plastic Laminate: NEMA LD 3.

2.03 MARKERBOARD ASSEMBLIES

- A. Porcelain-Enamel Markerboard Assembly: Balanced, high-pressure, factory-laminated markerboard assembly of 3-ply construction consisting of backing sheet, core material, and 0.021-inch- thick, porcelain-enamel face sheet with high gloss finish; surface to support magnetic aides.
 - 1. Available Manufacturers:
 - a. Basis of Design Product: Claridge Products & Equipment, Inc.
 - b. Acceptable manufacturer subject to meet specified requirements: PolyVision Corporation.
 - 2. Hardboard Core: 1/4 inch thick; with 0.005-inch- thick, aluminum foil 0.015-inch- thick, aluminum sheet 0.0129-inch- thick, galvanized steel sheet backing.
 - 3. Face Sheet: 3-coat process LCS Porcelain Enamel
 - 4. Color: No. 100 White unless otherwise indicated on the Drawings.
 - 5. Sizes: As indicated on the drawings.
- B. Series 5 Perimeter Trim: 5/8 inch wide.
 - 1. Finish: Clear anodized aluminum.
 - 2. Continuous chalktrough with end closure.
 - 3. Continuous maprail with cork insert.

2.04 MARKERWALL ASSEMBLIES

- A. Basis of Design Product:
 - 1. Claridge Products and Equipment, Inc. Wall-Write Marker Wall, WW3
- B. Porcelain-Enamel Markerboard Assembly: Balanced, high-pressure, factory-laminated markerboard assembly of 3-ply construction consisting of backing sheet, core material, and 0.021-inch- thick, porcelain-enamel face sheet with high gloss finish; surface to support magnetic aides.
 - 1. Hardboard Core: 1/4 inch thick; with 0.005-inch- thick, aluminum foil 0.015-inch- thick, aluminum sheet 0.0129-inch- thick, galvanized steel sheet backing.
 - 2. Face Sheet: 3-coat process LCS Porcelain Enamel
 - 3. Color: No. 100 White unless otherwise indicated on the Drawings.
 - 4. Sizes: As indicated on the drawings.
- C. Trim:
 - 1. Aluminum bottom and edge trim.
 - 2. Aluminum face trim.
- D. Adhesive: As recommended and approved by manufacturer.

2.05 TACKWALL ASSEMBLIES

- A. Basis of Design Product:
 - 1. Claridge Products and Equipment, Inc., Tack Wall, WW3
- B. Fabric-Faced Tack Assembly (TB-2_ : 1/4-inch- thick, fabric-faced cork sheet factory laminated to 1/4-inch thick hardboard backing. Colors and sizes as indicated on the drawings.
 - 1. Hardboard Core: 1/4 inch thick; with 0.005-inch- thick, aluminum foil 0.015-inch- thick, aluminum sheet 0.0129-inch- thick, galvanized steel sheet backing.
 - 2. Sizes: As indicated on the drawings.
- C. Trim:
 - 1. Aluminum bottom and edge trim.
 - 2. Aluminum face trim.
 - 3. Wrap frame in fabric to match tackable surface.

- D. Adhesive: As recommended and approved by manufacturer.
- 2.06 TACK ASSEMBLIES
 - A. Manufacturers:
 1. Claridge Products & Equipment, Inc.
 2. PolyVision Corporation.
 - B. Fabric-Faced Tack Assembly (TB-1) : 1/4-inch- thick, fabric-faced cork sheet factory laminated to 1/4-inch thick hardboard backing. Colors and sizes as indicated on the drawings.
- 2.07 MARKERBOARD AND TACKBOARD ACCESSORIES
 - A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; of size and shape indicated.
 1. Factory-Applied Trim: Manufacturer's standard.with no visible screws or exposed joints.
 2. Tackboards shall be unframed with edges wrapped in vinyl at display cabinets with butt joints between panels.
 - B. Chalktray: None.
 - C. Tack Strip: Provide the following accessories for each board:
 1. Rail: Continuous and integral with map rail; fabricated from cork approximately 1 to 2 inches wide with vinyl finish. Color as indicated on the drawings.
 2. End Stops: Located at each end of map rail.
 3. LCS Markers: Broad Tip, assorted colors. Packed 12 per box. One per board.
 4. LCS Erasers: One per board.
- 2.08 FABRICATION
 - A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
 - B. Visual Display Boards: Factory assemble visual display boards, unless otherwise indicated.
 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
 - C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
 2. Provide manufacturer's standard vertical-joint spline system between abutting sections of markerboards.
 3. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
 4. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
 - D. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to neat, hairline closure.
 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.
- 2.09 ALUMINUM FINISHES
 - A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - C. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - D. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine walls and partitions for proper backing for visual display surfaces.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove dirt, scaling paint, projections, and depressions that will affect smooth, finished surfaces of visual display boards.

- B. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, and substances that will impair bond between visual display boards and surfaces.
- 3.03 INSTALLATION, GENERAL
- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated by architect. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- 3.04 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY UNITS
- A. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
 - 1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
- 3.05 CLEANING AND PROTECTION
- A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
 - B. Touch up factory-applied finishes to restore damaged or soiled areas.
 - C. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION 10 11 00

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Cast and Cutout dimensional characters (letters and numbers) for exterior use.
 - 2. Room Identification Panel signs
 - 3. Signage accessories.

1.02 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
 - 1. Provide message list for each sign, including large-scale details of wording, lettering, and layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
 - 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter and number) required. Show character style, material, finish, and method of attachment.
 - 2. Casting: Show representative texture, character style, spacing, finish, and method of attachment.
 - 3. Approved samples will be returned for installation into Project.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of signage manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
 - 1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
 - a. Room Identification
 - b. Signs for Accessible Spaces
 - c. Maximum Occupancy Capacity: Cafeteria Dining, Gymnasium and Media Center (Library).

1.04 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

1.05 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
 - 1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.
 - 2. Basis-of-Design Product: The design for each sign is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.02 CAST-METAL PLAQUE

- A. General: Provide casting free from pits, scale, sand holes, and other defects. Comply with requirements specified for metal, border style, background texture, and finish and in required thickness, size, shape, and copy.
- B. Manufacturers:
 - 1. A.R.K. Ramos.
 - 2. Gemini Incorporated.
 - 3. Southwell Co. (The).
 - 4. South Texas Graphic Specialties.

- C. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- D. Border Style: None (straight), polished edge.
- E. Background Texture: As indicated by the drawings.
- F. Mounting: Concealed studs for substrates encountered.

2.03

2.04 PANEL SIGN TYPES

- A. Manufacturers/Vendors:
 - 1. Architectural Graphics Products (AGP).
 - 2. South Texas Graphics
- B. Room Identification Signs:
 - 1. Material: Plastic laminate.
 - 2. Perimeter: Unframed.
 - 3. Copy: Tactile and braille Subsurface.
 - 4. Character Style: Match District standard.
 - 5. Text: To be determined.
 - 6. Message: Fixed.
 - 7. Sizes:
 - a. Sign: As indicated on the Drawings.
 - b. Character: Minimum height as required for TAS 2012 compliance
 - 8. Colors: As selected by Architect

2.05 DIMENSIONAL CHARACTERS

- A. Manufacturers/Vendors:
 - 1. Architectural Graphics Products (AGP).
 - 2. South Texas Graphics
- B. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- C. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 6063-T5.
- D. Cast Characters: Form individual letters and numbers by casting. Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.
 - 1. Material: Aluminum.
- E. Fabricated Characters: Fabricate letters and numbers to required sizes and styles, using metals and thicknesses indicated. Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories. Comply with requirements indicated for finish, style, and size.
 - 1. Aluminum Sheet: Not less than 0.090 inch (2.30 mm) thick.
 - 2. Character Height: As indicated on the drawings.
 - 3. Character Style: As indicated on the drawings.

2.06 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work. Provide spacers at locations where mounting of cast letters projects from wall surface.

2.07 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

- B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.
 - C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
 - D. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 INSTALLATION
- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
 - B. Dimensional Characters: Mount characters using standard fastening methods recommended in writing by manufacturer for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - 1. Projected Mounting: Mount characters at projection distance to match existing, from wall surface indicated.
 - C. Cast-Metal Plaques: Mount plaques using standard fastening methods recommended in writing by manufacturer for type of wall surface indicated.
 - 1. Concealed Mounting: Mount plaque by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
 - D. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
 - 1. Silicone-Adhesive Mounting: Use liquid-silicone adhesive recommended in writing by sign manufacturer to attach signs to irregular, porous, or vinyl-covered surfaces. Use double-sided vinyl tape where recommended in writing by sign manufacturer to hold sign in place until adhesive has fully cured.
 - 2. Where panel signs are scheduled or indicated to be mounted on glass, provide matching plate on opposite side of glass to conceal mounting materials.
- 3.03 CLEANING AND PROTECTION
- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 21 13.17 – PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking.
 - 2. Division 10 Section "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, shelves and similar accessories.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of reinforcements for compartment-mounted grab bars.
 - 2. Show locations of centerlines of toilet fixtures.
- C. Samples for Initial Selection: For each type of unit indicated. Include samples of hardware and accessories involving material and color selection.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for units, prepared on 6-inch- square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.
- E. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Material Fire Ratings:
 - a. National Fire protection Association (NFPA): Class B.
 - b. International Code Council (ICC): Class B.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities", ICC/ANSI A117.1 and Texas Accessibility Standards (TAS) for toilet compartments designated as accessible.

1.04 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.06 WARRANTY

- A. Warrant the toilet compartment stiles, doors and panels specified herein for ten years against becoming unserviceable, or causing an objectionable appearance, as a result of either defective or nonconforming materials.
- B. Defects shall include, but not be limited to, the following:
 - 1. Corrosion
 - 2. Breakage
 - 3. Delamination
 - 4. Hardware loosening or breakage
- C. Warrant the hardware specified herein for one year against becoming unserviceable, or causing an objectionable appearance, as a result of either defective or nonconforming materials and workmanship. Defects include, but are not limited to:
 - 1. Hardware loosening
 - 2. Hardware breakage

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.

- C. Brass Castings: ASTM B 584.
 - D. Brass Extrusions: ASTM B 455.
 - E. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
 - 1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z.
 - 2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvanized.
 - F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
 - G. Stainless-Steel Castings: ASTM A 743/A 743M.
- 2.02 PHENOLIC CORE COLOR THROUGH UNITS
- A. Manufacturers:
 - 1. ASI Accurate Partitions
 - 2. ASI Global Partitions.
 - 3. Colombia Partitions
 - 4. Bobrick
 - 5. Bradley
 - B. Toilet-Enclosure Style: Floor and Ceiling anchored..
 - C. Urinal-Screen Style: Wall hung.
 - D. Door, Panel, Screen, and Pilaster Construction: Solid phenolic core color-through panel material with melamine facing on both sides fused to substrate during manufacture (not separately laminated), and with eased and polished edges. Provide minimum 3/4-inch-thick doors and pilasters and minimum 1/2-inch-thick panels.
 - 1. Provide with no-sightline system consisting of door and pilaster lapped edges on strike side of door and door and pilaster lapped edges on hinge side of door (unless continuous hinge is used).
 - E. Leveling Device: Fabricated from 7-gauge, 3/16-inch, hot rolled steel bar, chromate-treated and zinc-plated; through bolted to base of stile.
 - F. Pilaster Shoes: Fabricated from stainless-steel sheet, not less than 0.031-inch nominal thickness and 4 inches high, finished to match hardware.
 - G. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
 - H. Phenolic Core Color Through Panel Finish:
 - 1. Color and Pattern: Homogenous color and pattern throughout; Color as indicated on Drawings, with manufacturer's standard designation .
- 2.03 DOORS AND DIVIDING PANELS
- A. Standard Privacy:
 - 1. Height: 55 inches high and mounted at 14 inches above the finished floor.
 - 2. Doors: 60 degree angle on two opposite edges for enhanced privacy.
 - 3. Dividing Panels: Slotted on one edge to accept wall bracket.
- 2.04 ACCESSORIES
- A. Hardware and Accessories: Manufacturer's standard design, institutional operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard, extruded heavy duty aluminum, 8-inch wrap around , institutional type.
 - a. Hinges are through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts.
 - b. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 9 degree increments.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Provide pull on opposite side of latch.
 - 7. Aluminum Heat Sink: fastened to bottom edge of doors and panels
 - B. Floor and Ceiling Anchored: Manufacturer's standard, extruded-aluminum head rail mounting bar with manufacturer's standard finish.
 - C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.
- 2.05 FABRICATION

- A. O Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels or Screens and Walls: 1 inch.
 - B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.02 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10 21 13.17

SECTION 10 26 13 - CORNER GUARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 1. Corner guards and installation accessories.

1.02 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each corner guard protection unit.
- B. Shop Drawings: For each corner guard unit showing locations and extent. Include sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of corner guard protection unit indicated.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain corner guard protection units from single source from single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of corner guard protection units and are based on the specific system indicated. Refer to Division 01 Section "Quality Requirements."
- D. Surface-Burning Characteristics: Provide impact-resistant, plastic corner guard protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
 1. Flame Spread: 25 or less.
 2. Smoke developed: 450 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant corner guard protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 2. Keep plastic sheet material out of direct sunlight.
 3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

PART 2 - PRODUCTS

2.01 MANUFACTURER:

- A. Koroseal

2.02 CORNER GUARDS

- A. Korogard G100 Series, Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90-degree turn to match wall condition.
 1. Cover: Extruded rigid plastic, minimum 0.085-inch wall thickness; as follows:
 - a. Profile: Nominal 2-inch-long leg and 1/8-inch corner radius.
 - b. Height: As indicated on Drawings.
 - c. Color and Texture: Clear, smooth texture.
 2. Continuous Retainer: Minimum 0.060-inch thick, one-piece, extruded aluminum.
 3. Accessories: Retainer clips; plastic top and bottom caps color matching cover.
 4. Fasteners: Oval head, chrome plated, #6 x 1-inch sheet metal screw.
 5. Adhesive: Type recommended by manufacturer for use with material being adhered to substrate indicated. Use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

2.03 FABRICATION

- A. Fabricate impact-resistant corner guard protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

- B. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant corner guard protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant corner guard protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

- A. General: Install impact-resistant corner guard protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - 1. Install impact-resistant corner guard protection units in corridors, hallways and other locations at exterior corners, typically.
 - 2. Provide splices, anchors, and other accessories required for a complete installation.
 - a. Provide anchoring devices to withstand imposed loads.

3.04 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

END OF SECTION 10 26 13

SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Public-use washroom accessories.
 - 2. Custodial accessories.
- B. Related Sections include the following:
 - 1. Division 06 – Rough Carpentry for wood blocking in walls,

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.
 - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.04 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.05 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.02 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.
- C. Toilet Tissue Dispenser: Furnished by Owner for installation by Contractor.
 - 1. Description: Multi- Roll Toilet Tissue dispenser
 - 2. Mounting: Surface mounted.
 - 3. Satin finish stainless steel
- D. Soap Dispenser: Furnished by Owner for installation by Contractor.
 - 1. Mounting: Vertically oriented, surface mounted.
- E. Paper Towel Dispenser: Furnished by Owner for installation by Contractor.
 - 1. Mounting: Surface mounted.
- F. Grab Bar: Wall Mounted Grab Bars.
 - 1. Basis-of-Design Product: Bobrick B-5806 series
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish.
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length: As indicated on Drawings.
- G. Mirror Unit: Wall Mounted Mirror:
 - 1. Basis-of-Design Product: Bobrick – B165-2460. Tall mirror.
 - 2. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Welded and ground smooth.
 - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - 4. Size: 24 inches wide x 60 inches high
- H. Mirror Unit: Wall Mounted Mirror Above Lavatories:
 - 1. Basis-of-Design Product: Bobrick – B165-2436.
 - 2. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Welded and ground smooth.
 - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - 4. Size: 24 inches wide x 36 inches high.
- I. Sanitary-Napkin Disposal Unit: Sanitary Product Receptacle
 - 1. Basis-of-Design Product: Bobrick B270 Series E.
 - 2. Mounting: Surface mounted.
 - 3. Door or Cover: Self-closing disposal-opening cover and hinged face panel with tumbler lockset.
 - 4. Receptacle: Removable.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
- P. Combination Utility Shelf with Mop and Broom Holder
 - 1. Basis of Design Product: Bobrick-B224x36
 - 2. Mounting: Surface,
 - 3. Length: 30 inches
 - 4. Shelf: 8 inch with return edge
 - 5. Finish: Stainless steel, satin finish.
 - 6. Mop holders: 4

2.03 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf , when tested according to method in ASTM F 446.

3.02 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 TOILET ACCESSORY SCHEDULE

- A. Install Owner furnished paper towel dispensers and soap dispensers at each new sink or lavatory as indicated on the Drawings
- B. Install Owner furnished toilet tissue dispensers at each new water closet; install at mounting heights indicated on the Drawings.
- C. Install Owner furnished soap dispensers at each new lavatory or sink in the project.
- D. Grab bars at each and every location required by local, state, or ADA regulations regarding handicapped accessibility.
- E. Mirrors as follows:
 - 1. Mirrors located as indicated on Drawings.
 - 2. Plastic anchors are not acceptable for mirror installation.

END OF SECTION 10 28 00

SECTION 10 44 00 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Portable fire extinguishers.
 - 2. Fire-protection cabinets for portable fire extinguishers.

1.02 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
 - 1. Fire Extinguishers: Include rating and classification.
 - 2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.04 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product: The design for each product is based on products indicated as manufactured by Larsen's Manufacturing Company. Subject to compliance with requirements, provide the named product or a comparable product by one of the following manufacturers:
 - 1. General Fire Extinguisher Corporation.
 - 2. JL Industries, Inc.

2.02 PORTABLE FIRE EXTINGUISHERS

- A. Fire Extinguishers :
 - 1. MP Multi-Purpose Series Dry Chemical, Rated 4A-80B:C, 10 Pounds, equal to Larsen's Model No. MP-10.
 - 2. WC Series Wet Chemical, Rated 2A:K; 6 liters, equal to Larsens Model No. WC-6L.for installation in Kitchen area.

2.03 FIRE-PROTECTION CABINET

- A. Fire-Protection Cabinets:
 - 1. Larsen's Architectural Series Model No. FS2712-RL
 - a. Recessed, 5/16" Flat Trim style projection
 - b. Recessed Handle
 - c. Door: Clear Anodized Aluminum "Vertical Duo with Larsen-Loc," glazing to be Clear Tempered Safety Glass
 - d. Provide extinguisher mounting hardware and cabinet attachment hardware as required for a complete assembly.

2.04 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Factory finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 PREPARATION
- A. Prepare rough openings for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.
- 3.03 INSTALLATION
- A. General: Install fire-protection specialties in locations and at mounting heights indicated on the drawings and in compliance with ADA requirements.
 - B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
 - C. Key Box: Install at location and height required by authority having jurisdiction.
- 3.04 ADJUSTING AND CLEANING
- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
 - B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
 - C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
 - D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.
 - E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 00

SECTION 10 51 13 - METAL LOCKERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Welded frame, standard metal lockers.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for support base.

1.02 DEFINITIONS

- A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

1.03 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show base, sloping tops, filler panels, recess trim and other accessories.
 - 2. Include locker identification system.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For metal lockers and locker benches in manufacturer's standard sizes.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.
- G. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative of metal locker manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal lockers and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Regulatory Requirements: Where metal lockers are indicated to comply with accessibility requirements, comply with TAS.
 - 1. Provide not less than 1 shelf located no higher than 54 inches above the floor for side reach.
 - 2. Provide 1 shelf located at bottom of locker no lower than 9 inches above the floor for side reach.
 - 3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.
- B. Deliver master and control keys, combination control charts to Owner by registered mail or overnight package service. Submit control chart in hard copy and electronic and electronic format.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:
 - 1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
 - 2. Recessed openings.
 - 3. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish recessed opening dimensions and proceed with fabricating metal lockers without field measurements. Coordinate wall and floor construction to ensure that actual recessed opening dimensions correspond to established dimensions.

1.07 COORDINATION

- A. Coordinate size and location of concrete bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.08 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.

- b. Faulty operation of latches and other door hardware.
- 2. Damage from deliberate destruction and vandalism is excluded.
- 3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.
- 4. Warranty Period for All-Welded Metal Lockers: Lifetime from date of Substantial Completion.

1.09 EXTRA MATERIALS

- A. Furnish extra materials described below, before construction begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size units of the following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than 2 units:
 - a. Locks.
 - b. Identification plates.
 - c. Hooks.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
 - 3. Basis-of-Design Product: The design for each metal locker specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.
- B. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.
- C. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.03 WELDED, STANDARD METAL LOCKERS

- A. Products:
 - 1. List Industries Inc.; Superior Lockers.
 - 2. Penco Products, Inc., Subsidiary of Vesper Corporation; Guardian Lockers.
- B. Locker Sizes and Arrangement: Double tier, sizes as indicated on Drawings.
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated, cold-rolled steel sheet with thicknesses as follows:
 - 1. Tops, Bottoms, and Intermediate Dividers: 0.0359 inch, with single bend at sides.
 - 2. Backs and Sides: 0.0359 inch thick, with full-height, double-flanged connections.
 - 3. Shelves: 0.0359 inch thick, with double bend at front and single bend at sides and back.
- D. Frames: Channel formed; fabricated from 0.0598-inch- thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.
 - 1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical frame members.
 - 2. Frame Vents: Fabricate vertical face frames with vents.
- E. Doors: One-piece; fabricated from 0.0598-inch- thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.
 - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 - 2. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch- thick, cold-rolled steel sheet; welded to inner face of doors.
 - 3. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 - 4. Door Style: Vented panel as follows:
 - a. Louvered Vents: Not less than three louver openings at top and bottom.

- F. Hinges: Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. Hinges: Manufacturer's standard, steel continuous type.
- G. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry resistant.
 - 1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with 3 latch hooks and doors less than 48 inches high with 2 latch hooks; fabricated from minimum 0.0966-inch-thick steel; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
- H. Built-in Combination Locks: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key to match the existing school master key.
 - 1. Bolt Operation: Manually locking deadbolt or automatically locking spring bolt.
- I. Equipment: Equip each metal locker with identification plate and the following, unless otherwise indicated:
 - 1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
- J. Accessories:
 - 1. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, 0.0329 inch thick.
 - a. Closures: Vertical end type.
 - b. Sloped top corner fillers, mitered.
- K. Finish: Baked enamel.
 - 1. Color(s): As indicated by Architect from manufacturer's full range.

2.04 FABRICATION

- A. General: Fabricate metal lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet, unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for a complete installation.
- B. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections, with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.
- C. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.
- D. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch high.
- E. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloped top corner fillers, mitered.
- F. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

2.05 STEEL SHEET FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.
- C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.
- D. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and Retain subparagraph below if retaining "baked-enamel" option in last subparagraph above.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.

- B. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
 - 4. Attach filler panels with concealed fasteners. Locate fillers panels where indicated on Drawings.
 - 5. Attach sloping top units to metal lockers, with closures at exposed ends.
- 3.03 ADJUSTING, CLEANING, AND PROTECTION
- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
 - B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.
 - C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

END OF SECTION 10 51 13

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Metal storage shelving

1.02 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for metal storage system.
- B. Maintenance Data: Include data in Maintenance Manual specified in Division 01 Section "Operation and Maintenance Data."
- C. Shop Drawings: Submit shop drawings showing location, ranges, and extent of metal shelving systems. Show installation details at any special or non-standard conditions and attachment requirements to various substrates.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm (material producer) with not less than 3 years of production experience, whose published literature clearly indicates general compliance of products with requirements of this section
- B. Installer Qualifications: Firm specializing in metal storage shelving installation with not less than 2 years of experience in installation of metal storage shelving similar to that required for this project
- C. Single Source Responsibility: Provide material produced by a single manufacturer for each shelving unit type.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with written instructions and recommendations of manufacturer for special delivery, storage, and handling requirements.

1.05 SEQUENCING AND SCHEDULING

- A. Sequence metal storage shelving installation with other work to minimize possibility of damage and soiling during remainder of construction period.

PART 2 - PRODUCTS

2.01 STORAGE SHELVING UNITS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include the following:
 - 1. Lyon Metal Products, Inc.
 - 2. Spacesaver Corp.
 - 3. Supreme Equipment & Systems Corp.
 - 4. Dixie Metal Shelving
- B. General: Minimum 18 gauge cold-rolled steel sheet metal uprights and 22 gauge cold-rolled sheet metal shelves washed to receive powder coated baked enamel finish, higher gauge where required to provide appropriate loading capacity.
- C. Open Shelving:
 - 1. Provide heavy-duty open shelving units consisting of four upright corner pilasters, 18 gauge, slotted to receive clips clipped together with shelves as indicated. Provide cross-braces laterally and at ends as required for stability with intended load. Shelves adjustable 1-½" on center. Provide 36" wide by 84" high units, unless otherwise indicated on drawings or in specifications.
 - 2. Shelf Depth: Provide shelving of standard depth as scheduled.
 - 3. Unit Configuration: Provide shelf units in configuration as follows:
 - a. Standard Upright Assembly: Provide complete unit equipped with four uprights; shelves and top designed to stand independently where single unit scheduled.
 - b. Starter/Adder Assembly: Provide first unit of each bank with four uprights, shelves, and top to stand independently. Provide each succeeding unit with two uprights, shelves, and top to allow attachment to preceding unit. Provide one upright assembly at the end of each bank. Provide where multiple units scheduled.
 - 4. Shelves: Provide units with 7 shelves (counting top and bottom) as indicated:
 - a. Reinforced Shelves: Provide 14 gauge supports at front and back edge of each shelf.
 - 5. Each shelf shall be able to support a uniform load of 750 lbs. minimum.
- D. Color and Finishes: As selected by Architect from Manufacturer's standard list of colors and options.

PART 3 - EXECUTION

- 3.01 INSPECTION
 - A. Inspect areas and conditions in which metal storage shelving will be installed. Verify locations of power feeds, positioning of exits and aisle ways, and overall dimensions of space, including height and HVAC venting.
- 3.02 PREPARATION
 - A. Prior to installation of shelving system, vacuum floor surface to remove dust, debris, and loose particles. Resilient flooring wet mopped and dried or finished buffed. Verify that components, including size and finish, are those specified before installing.
- 3.03 INSTALLATION
 - A. Install shelving system and accessories after finishing operations, including painting, have been completed. Install system to comply with final layout drawings, in strict compliance with manufacturer's printed instructions. Position units level, plumb, and at proper location relative to adjoining units and related work. Adjust accessories to provide visually acceptable installation.
- 3.04 FIELD QUALITY CONTROL
 - A. Remove and replace shelving components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.
- 3.05 ADJUSTMENTS
 - A. Adjust components and accessories to provide visually acceptable installation.
- 3.06 CLEANING
 - A. Immediately upon completion of installation, clean components and surfaces following manufacturer's recommended procedures.
 - B. Remove surplus materials, rubbish, and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.
- 3.07 PROTECTION
 - A. Protect system against damage during remainder of construction period.

END OF SECTION 10 56 13

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes furnishing and installing the following:
 - 1. Appliances and equipment
- B. Related Sections include the following:
 - 1. Cabinets in which appliances and equipment will be installed are described in Division 06 Section "Plastic Laminate Clad Cabinets" of these specifications; cooperate as necessary with all other trades to ensure proper and adequate provision for installation and anchorage of the selected equipment.
 - 2. Utility hook-up to equipment is described in plumbing and electrical sections of these specifications; cooperate as necessary with all other trades to ensure proper and adequate provision for the required utility sizing and locations.

1.02 QUALITY ASSURANCE

- A. During installation of the appliances and equipment, provide at least one person who shall be thoroughly familiar with installation requirements of the equipment and who shall be present at all times during actual installation and who shall personally supervise the installation work.

1.03 SUBMITTALS

- A. Product Data: For each piece of equipment and appliance.
- B. Guarantees: Upon completion of the installation, and as a condition of its acceptance, deliver to the Architect all copies of guarantees, warranties, operating instructions, and maintenance instructions under provisions of Division 01 Section "Closeout Procedures."

1.04 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect appliances and equipment before, during, and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 COUNTERTOP MICROWAVE OVEN

- A. Location: As indicated on Drawings.
- B. Description: 1.6 cubic feet, counter top location.
- C. Manufacturer and Model No. GE PEB9159SJSS
- D. Finish: Stainless Steel
- E. Accessories: Electrical Cord

2.02 CABINET MICROWAVE OVEN

- A. Location: As indicated on Drawings.
- B. Description: 1.1 cubic feet.
- C. Manufacturer and Model No. GE JESP113SPSS.
- D. Finish: Stainless Steel
- E. Accessories: Electrical Cord

2.03 REFRIGERATOR (Type1- Top Freezer)

- A. Location: As indicated on Drawings.
- B. Manufacturer and Model No.: General Electric Model GIE22JSNRSS, stainless steel finish.
- C. Door Swing: Orient door swing as required for location
- D. Ice Maker

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Utilities: See Divisions 22 and 26 for plumbing and electrical requirements.
- 3.03 FIELD QUALITY CONTROL
 - A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - B. Tests and Inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
 - C. An appliance will be considered defective if it does not pass tests and inspections.
 - D. Prepare test and inspection reports.
- 3.04 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 11 31 00

SECTION 12 24 13 - MANUAL WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually operated, roll-up fabric interior window shades including mounting and operating hardware.

1.2 RELATED SECTIONS

- A. Section 06 10 00 – Rough Carpentry: Blocking for support of window shade hardware.
- B. Section 09 29 00 - Gypsum Board Assemblies: Suspended gypsum board ceilings to contain recessed window shade pockets.
- C. Section 09 51 13 - Acoustical Panel Ceilings: Suspended acoustical panel ceilings to contain recessed window shade pockets.

1.3 REFERENCES

- A. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.
- B. ANSI/WCMA A100.1-2022. For manual window shades with closed loop bead chains, all shades will meet all current standards mandated by the Consumer Product Safety Commission.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product specified, including:
 - 1. Preparation instructions and recommendations.
 - 2. Installation and maintenance instructions.
 - 3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, and operating instructions.
 - 4. Storage and handling requirements and recommendations.
 - 5. Mounting details and installation methods.
- B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.
- D. Selection Samples: For each finish product specified, one complete set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and

aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.

- F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- G. Standard manufacturer's defect warranty: Standard manufacturer's warranty documents indicating compliance with requirements of Section 1.9 below.
- H. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years' experience in manufacturing products comparable to those specified in this section. If manufacturer does not meet minimum experience requirement, please submit life cycle test data showing minimum 2000 complete operational cycles for each year of warranty showing no failure and that shade remains fit for use as an operable shade).
- B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use. Show complete manufacturer data (name, location, contact) and certification from manufacturer that the fabrics sourced for this project comply with the test data provided.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.
- D. Store products in manufacturer's unopened packaging until ready for installation.

1.7 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.8 PROJECT CONDITIONS

- A. Install roller shades after finish work and ambient temperature, humidity, and ventilation conditions are maintained at levels recommended for project upon completion.

1.9 WARRANTY

- A. Hardware and Shade Fabric: Draper® standard twenty-five-year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Draper Inc.
 - 2. Levelor Contract: A Newell Rubbermaid Company
 - 3. Hunter Dougl's Contract
 - 4. CACO, Inc. Window Fashions

2.2 MANUALLY OPERATED WINDOW SHADES

- A. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Clutch-operated FlexShade® as manufactured by Draper, Inc.
 - 1. Operation: Bead chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
 - a. Spring-assist bead chain clutch mechanism: Adjustment-free system includes spring-assist components to reduce lifting forces required to raise the shade. Manufacturer shall provide estimated torque for shade unit. Spring-assist is recommended on estimated non-spring-assist torque above 6 lb.-in; required on shades with an estimated torque higher than 15 lb.-in.
 - b. Bead chain loop: Stainless Steel.
 - c. Idler Assembly: Provide roller idler assembly of molded nylon with adjustable or spring-loaded length idler pin to facilitate easy installation, and removal of shade for service.
 - d. Bead Chain Hold Down: Spring-Loaded Tensioner complying with ANSI/WCMA A100.1-2022 safety standard.
 - 2. Single Roller Configuration:
 - a. Mounting:
 - 1) Universal Mounting brackets.
 - b. Brackets: Plated stamped steel. Provide size compatible with roller size.
 - 1) Mounted to wall.
 - 2) Finish: White.
 - c. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - 1) Idler endcap to have optional levelling adjustment.
 - 2) Endcap covers: To match fascia or headbox color.
 - d. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
 - 1) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
 - 2) Shape: Square Fascia Panel.
 - 3) Finish: Selected from Manufacturers standard range.
 - e. Headbox Ceiling/Wall style: "L" shaped extruded aluminum back and top cover piece with removable extruded aluminum closure and stamped steel endcaps:
 - 1) Finish: Selected from Manufacturers standard range.
 - f. Headbox, Pocket style: Extruded aluminum U-shaped pocket with removable closure and endcaps.
 - 1) Finish: Selected from Manufacturers standard range.
 - 3. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Minimum roller diameter 1.5 inches. Tube diameters less than 1.5 inches shall not be acceptable unless manufacturer provides deflection analysis showing deflection limited to $\leq \frac{\text{width(inches)}}{700}$ at 1.5 X design load.
 - 4. Fabric to tube attachments: LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
 - 5. Shade slat:

- a. Closed pocket elliptical slat: 1 inch (25 mm) aluminum elliptical slat inside of a 1-5/8 inch (41 mm) pocket with heat sealed ends.
- b. Open pocket elliptical slat: 1 inch (25mm) aluminum elliptical slat with plastic ends inside of a 1-5/8 inch (41 mm) pocket.
- c. Small flat exposed hem bar: 7/8 inch by 5/16 inch (22 mm by 8 mm) aluminum rectangular hem bar with plastic end caps.
- d. Large flat exposed hem bar: 1-1/2 inch by 5/16 inch (38 mm by 8 mm) aluminum rectangular hem bar with plastic end caps.
- e. Small round exposed hem bar: 5/8 inch (16 mm). Aluminum with plastic end caps.
- 6. Light Gap Reduction Channels.
 - a. Aluminum L Angle – 3/4 inch (19 mm) by 1 inch (25 mm).
 - b. Aluminum L Angle -1 inch (25 mm) by 2-3/4 inches (70mm).
 - c. Vinyl L Angle-1-1/2 inches (38 mm) by 3/4 inch (19 mm).
 - d. U Channel -1 inch (25 mm) by 2-1/2 inches (64 mm).
 - e. H Channel – 1 inch (25 mm) by 5 inches (127 mm).
- 7. Interior cable guide kit.
 - a. Slat/hem bar is a 5/8-inch (16 mm) round bar for use in a 1-5/8 inch (41 mm) open-ended hem pocket.

2.3 FABRIC

- A. Light-Filtering Fabrics
 - 1. PVC Coated Fiberglass
 - a. Basketweave
 - 1) E Screen™ 5% by Mermet®: PVC coated fiberglass yarn woven in 2 by 2 basketweave. Fire rating: NFPA 701-10 TM#1, California U.S. Title 19, CAN/ULC-S109-03 Small & Large Flame Test. Environmental Benefits: Certified to UL GREENGUARD® and GREENGUARD Gold® standards for low chemical emissions into indoor air during product usage. RoHS compliant – lead free. Bacterial and fungal resistance: ASTM E2180, ASTM G21. Average 5 percent open, .016 inches thick, 10.7 oz/square yard.
- B. Color and pattern: As indicated in Color Schedule on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- C. Shade pockets:
 - 1. Install shade pockets prior to installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 - 2. Install shade pockets in conjunction with installation of suspended ceiling system. Attach to supporting structure with screws through top of pocket at 24 inches (610 mm) minimum centers.
 - 3. Install corner pieces securely and in alignment with pockets.
 - 4. Install pocket ends securely and in alignment with pockets.
 - 5. After interior construction is essentially complete, install shade and operating mechanism in pocket.
- D. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
 - 1. Fascias.
 - 2. Closure panels.
 - 3. Endcaps.
- E. Install headbox, side channels, and sill channel with sealant specified in Section 07900 - Joint Sealers to eliminate light leaks at perimeter of shade system.
- F. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

3.4 TESTING AND DEMONSTRATION

- A. Test window shades to verify that operating mechanism and other operating components are functional. Correct deficiencies.
- B. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 12 24 13

SECTION 12 36 61.16 - SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.
- B. Related Requirements:
 - 1. Division 22 Sections "Plumbing Fixtures" for sinks and plumbing fittings.

1.02 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches square.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

1.06 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.07 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.01 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Materials: Non-porous, homogeneous material composition of acrylic polymer, aluminum trihydrate filler and pigment.
- B. Basis of Design Product: Corian (SS-1, SS-2)
- C. Colors and Patterns: As indicated on Color/Finish Schedule on the Drawings.
- D. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.02 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Premium .
- B. Configuration, unless otherwise indicated on Drawings :
 - 1. Front: Straight, slightly eased at top 1-1/2-inch laminated bullnose.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: 3/4-inch- thick, solid surface material with front edge built up with same material.
- D. Backsplashes: 1/2-inch- thick, solid surface material.
- E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.
 - 2. Install integral sink bowls in countertops in the shop.
- F. Joints: Fabricate countertops in sections for joining in field.
 - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit.
- G. Cutouts and Holes:
 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.03 WINDOW SILLS

- A. Window Sills: 1/2 inch thick solid surfacing material.
- B. Edge Details: As indicated on Drawings.

2.04 INSTALLATION MATERIALS

- A. Adhesive: One component silicone, ASTM C920; product recommended by solid surface material manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- H. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 12 36 61.16

SECTION 13 10 10 - BULLET RESISTANT PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Bullet resistant fiberglass wall panels

1.2 REFERENCES

- A. NIJ Standard 0108.01 - (National Institute of Justice) Standard for Ballistic Resistant Protective Materials.
- B. Underwriters Laboratories: UL 752 - Standard for Bullet Resisting Equipment and ASTM E 119-98-Standard Test Methods for Fire Tests of Building Construction and Materials.
- C. MIL-P-46593A-Numerical simulation of ballistic impact on composite laminates, MIL-STD-622F-V50 Ballistic Test for Armor.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, fabricate and install all partition materials specified in this section to meet or exceed the requirements of UL 752.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets including:
 - 1. Test reports: Current UL listing verification and UL 752 Test Results as provided by Underwriters Laboratories.
 - 2. Product specifications,
 - 3. Preparation instructions and recommendations.
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation methods.
- B. Shop Drawings: Submit Manufacturer approved shop drawings detailing dimensions, anchorage and finishes, as necessary to ensure proper field installation procedures. Coordinate locations with those listed in the Contract Drawings.
- C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of five (5) years experience.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Total Security Solutions, Inc. 170 National Park Dr., Fowlerville, MI 48836; Tel, 800,513,1468; Email: info@tssbulletproof.com; www.tssbulletproof.com
 - 2. ARMORTEX, 5926 Corridor Parkway, Schertz, Texas, 800-880-8306, www.armortex.com.

2.2 ARMOR BULLET RESISTANT FIBERGLASS

- A. Bullet resistant fiberglass armor tested and approved to meet U.L. 752 for the level of protection specified.
 - 1. Product TA-2: Composite, bullet resistant, multiple layers of woven roving ballistic grade fiberglass cloth impregnated with thermoset polyester resin, compressed into flat rigid sheets.
 - a. Rating: UL 752 Level 3, UN Listed.
 - b. Panel Thickness: 1/2 inch.
 - c. Panel Weight: 5.0 Lbs per square foot.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and UL 752.
- B. Install panels using industrial adhesive and mastic approved by the manufacturer, screws and bolts. Maintain bullet resistant rating at junctures with concrete floor, door and window frames and other penetrations. Installation tolerance shall not exceed 1/16 inch for squareness, alignment, twist and plumb.
- C. Joints: reinforce with back-up layer of bullet resistant material 4-inches wide. The reinforced joint shall be equal to the bullet resistance of the panel.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 13 10 10

SECTION 21 00 00 - COMMON MECHANICAL REQUIREMENTS (FIRE PROTECTION)

PART 1 - GENERAL

A. Refer to Division 23, Section 23 00 00.

PART 2 - EXECUTION (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 21 00 00

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Pipes, fittings, and specialties.
 - 2. Fire-protection valves.
 - 3. Sprinklers.
 - 4. Pressure gages.

1.02 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175 psig maximum.

1.03 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.04 PERFORMANCE REQUIREMENTS

- A. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- B. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Sprinkler Occupancy Hazard Classifications:
 - a. Building Service Areas: Ordinary Hazard, Group 1.
 - b. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. All other Areas: Light Hazard.
 - 2. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - 3. Maximum Protection Area per Sprinkler: Per UL listing.
 - 4. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - a. Light-Hazard Occupancies: 100 gpm for 30 minutes.
 - b. Ordinary-Hazard Occupancies: 250 gpm for 60 to 90 minutes.

1.05 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- E. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."

1.07 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, above ceiling ductwork, above ceiling piping and partition assemblies.

1.08 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by NFPA 13 and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on Project.

1.09 WARRANTY

- A. Provide two year material and labor warranty on leaking piping and fittings. Contractor will be responsible for all repairs due to leaking and or dripping sprinkler piping.

PART 2 - PRODUCTS

2.01 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

2.02 STEEL PIPE AND FITTINGS

- A. Standard Weight, Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
- D. Grooved-Joint, Steel-Pipe Appurtenances:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International, Inc.
 - b. Corcoran Piping System Co.
 - c. National Fittings, Inc.
 - d. Shurjoint Piping Products.
 - e. Tyco Fire & Building Products LP.
 - f. Victaulic Company.
 2. Pressure Rating: 175 psig minimum.
 3. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 4. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.03 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick.
 1. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.04 LISTED FIRE-PROTECTION VALVES

- A. General Requirements:
1. Valves shall be UL listed or FM approved.
 2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig.
- B. Ball Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Victaulic Company.
 2. Standard: UL 1091 except with ball instead of disc.
 3. Valves NPS 1-1/2 and Smaller: Bronze body with threaded ends.
 4. Valves NPS 2 and NPS 2-1/2: Bronze body with threaded ends or ductile-iron body with grooved ends.
 5. Valves NPS 3: Ductile-iron body with grooved ends.
- C. Iron Butterfly Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Milwaukee Valve Company.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 2. Standard: UL 1091.
 3. Pressure Rating: 175 psig.
 4. Body Material: Cast or ductile iron.
 5. End Connections: Grooved.
- D. Check Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Anvil International, Inc.
 - b. Milwaukee Valve Company.
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - f. Viking Corporation.
 - 2. Standard: UL 312.
 - 3. Pressure Rating: 250 psig minimum.
 - 4. Type: Swing check.
 - 5. Body Material: Cast iron.
 - 6. End Connections: Flanged or grooved.
 - E. Iron OS&Y Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.; Crane Valve Group.
 - b. Mueller Co.; Water Products Division.
 - c. NIBCO INC.
 - d. Tyco Fire & Building Products LP.
 - e. Watts Water Technologies, Inc.
 - 2. Standard: UL 262.
 - 3. Pressure Rating: 250 psig minimum.
 - 4. Body Material: Cast or ductile iron.
 - 5. End Connections: Flanged or grooved.
- 2.05 TRIM AND DRAIN VALVES
 - A. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating: 175 psig minimum.
 - B. Ball Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Anvil International, Inc.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Tyco Fire & Building Products LP.
 - e. Victaulic Company.
 - f. Watts Water Technologies, Inc.
- 2.06 SPECIALTY VALVES
 - A. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating:
 - a. Standard-Pressure Piping Specialty Valves: 175 psig minimum.
 - 3. Body Material: Cast or ductile iron.
 - 4. Size: Same as connected piping.
 - 5. End Connections: Flanged or grooved.
 - B. Alarm Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Globe Fire Sprinkler Corporation.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - e. Viking Corporation.
 - 2. Standard: UL 193.
 - 3. Design: For horizontal or vertical installation.
 - 4. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
- 2.07 SPRINKLER SPECIALTY PIPE FITTINGS
 - A. Branch Outlet Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Anvil International, Inc.
- b. National Fittings, Inc.
- c. Tyco Fire & Building Products LP.
- d. Victaulic Company.
- 2. Standard: UL 213.
- 3. Pressure Rating: 175 psig minimum.
- 4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
- 5. Type: Mechanical-T and -cross fittings.
- 6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
- 7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
- 8. Branch Outlets: Grooved, plain-end pipe, or threaded.
- B. Flow Detection and Test Assemblies:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGF Manufacturing Inc.
 - b. Reliable Automatic Sprinkler Co., Inc.
 - c. Tyco Fire & Building Products LP.
 - d. Victaulic Company.
 - 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 3. Pressure Rating: 175 psig minimum.
 - 4. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - 5. Size: Same as connected piping.
 - 6. Inlet and Outlet: Threaded.
- C. Sprinkler Inspector's Test Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Tyco Fire & Building Products LP.
 - b. Victaulic Company.
 - c. Viking Corporation.
 - 2. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 3. Pressure Rating: 175 psig minimum.
 - 4. Body Material: Cast- or ductile-iron housing with sight glass.
 - 5. Size: Same as connected piping.
 - 6. Inlet and Outlet: Threaded.
- D. Flexible, Sprinkler Hose Fittings: Flexible sprinkler piping is NOT allowed.

2.08 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Globe Fire Sprinkler Corporation.
 - 2. Reliable Automatic Sprinkler Co., Inc.
 - 3. Tyco Fire & Building Products LP.
 - 4. Viking Corporation.
- B. General Requirements:
 - 1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2. Pressure Rating for Automatic Sprinklers: 175 psig minimum.
- C. Automatic Sprinklers with Heat-Responsive Element:
 - 1. Early-Suppression, Fast-Response Applications: UL 1767.
 - 2. Nonresidential Applications: UL 199.
 - 3. Characteristics: Nominal 1/2-inch orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
- D. Sprinkler Finishes:
 - 1. Painted.
- E. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - 1. Ceiling Mounting: Chrome-plated steel, one piece, flat.
 - 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- F. Sprinkler Guards: (Install on sprinkler heads located in a) gym and b) stage)
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Reliable Automatic Sprinkler Co., Inc.

- b. Tyco Fire & Building Products LP.
 - c. Victaulic Company.
 - d. Viking Corporation.
 - 2. Standard: UL 199.
 - 3. Type: Wire cage with fastening device for attaching to sprinkler.
- 2.09 ALARM DEVICES
 - A. Alarm-device types shall match piping and equipment connections.
 - B. Electrically Operated Alarm Bell:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire-Lite Alarms, Inc.; a Honeywell company.
 - b. Notifier; a Honeywell company.
 - c. Potter Electric Signal Company.
 - 2. Standard: UL 464.
 - 3. Type: Vibrating, metal alarm bell.
 - 4. Size: 6-inch minimum- diameter.
 - 5. Finish: Red-enamel factory finish, suitable for outdoor use.
- 2.10 PRESSURE GAGES
 - A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AMETEK; U.S. Gauge Division.
 - 2. Ashcroft, Inc.
 - 3. Brecco Corporation.
 - 4. WIKA Instrument Corporation.
 - B. Standard: UL 393.
 - C. Dial Size: 3-1/2- to 4-1/2-inch diameter.
 - D. Pressure Gage Range: 0 to 250 psig minimum.
 - E. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.02 SERVICE-ENTRANCE PIPING

- A. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-Suppression Water-Service Piping."
- B. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.03 PIPING INSTALLATION

- A. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
- B. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- C. Install unions adjacent to each valve in pipes NPS 2 and smaller.
- D. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- E. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
- F. Install sprinkler piping with drains for complete system drainage.
- G. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- H. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- I. Install alarm devices in piping systems.
- J. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- K. Fill sprinkler system piping with water.
- L. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."

- M. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 21 Section "Sleeves and Sleeve Seals for Fire-Suppression Piping."
 - N. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 21 Section "Escutcheons for Fire-Suppression Piping."
- 3.04 JOINT CONSTRUCTION
- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
 - B. Install unions adjacent to each valve in pipes NPS 2 and smaller.
 - C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
 - D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 - F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
 - G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - H. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
 - I. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
- 3.05 VALVE AND SPECIALTIES INSTALLATION
- A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
 - B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 - C. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
 - D. Specialty Valves:
 1. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 2. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.
- 3.06 SPRINKLER INSTALLATION
- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels. Refer to detail on drawings for additional requirements.
- 3.07 IDENTIFICATION
- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
 - B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- 3.08 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 - B. Tests and Inspections:
 1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 2. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 3. Coordinate with fire-alarm tests. Operate as required.
- 3.09 CLEANING
- A. Clean dirt and debris from sprinklers.
 - B. Remove and replace sprinklers with paint other than factory finish.
- 3.10 PIPING SCHEDULE
- A. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller, shall be the following:
 1. Schedule 40, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - B. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 and larger, shall be the following:
 1. Schedule 40, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.11 SPRINKLER SCHEDULE

- A. Use sprinkler types in subparagraphs below for the following applications, (sprinkler heads with flexible branch piping are not allowed):
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Concealed sprinklers.
- B. Provide sprinkler types in subparagraphs below with finishes indicated.
 - 1. Concealed Sprinklers: Rough brass with finishes as indicated below and on the plans.
 - a. Acoustical Tile Ceilings: Factory painted white.
 - b. Metal panel ceilings: Factory painted silver or metallic finish.
 - c. Media Center Wood Panel Ceiling: Factory painted silver or metallic finish.
 - 2. Upright and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 13

SECTION 22 00 00 - COMMON MECHANICAL REQUIREMENTS (PLUMBING)

PART 1 - GENERAL

A. Refer to Division 23, Section 23 00 00.

PART 2 - EXECUTION (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 22 00 00

SECTION 22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

2.02 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass or split-casting brass type with polished, chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass or split-casting brass type with rough-brass finish.
 - g. Bare Piping in Equipment Rooms: One-piece, cast-brass or split-casting brass type with rough-brass finish.
- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.

3.02 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 22 05 18

SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. Iron ball valves.
 - 3. Bronze lift check valves.
 - 4. Bronze swing check valves.
 - 5. Bronze gate valves.
 - 6. Iron gate valves.
- B. Related Sections:
 - 1. Division 22 plumbing piping Sections for specialty valves applicable to those Sections only.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
 - 3. Division 33 water distribution piping Sections for general-duty and specialty valves for site construction piping.

1.02 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.03 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated.

1.04 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handwheel: For valves other than quarter-turn types.
 - 2. Handlever: For quarter-turn valves NPS 6 and smaller.
 - 3. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 5 plug valves, for each size square plug-valve head.
 - 4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Grooved: With grooves according to AWWA C606.

3. Solder Joint: With sockets according to ASME B16.18.
 4. Threaded: With threads according to ASME B1.20.1.
- G. Valve Bypass and Drain Connections: MSS SP-45.
- 2.02 BRONZE BALL VALVES
- A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.
- 2.03 BRONZE SWING CHECK VALVES
- A. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co..
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: PTFE or TFE.
- 2.04 BRONZE GATE VALVES
- A. Class 125, NRS Bronze Gate Valves:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Valve, Inc.
 - b. Crane Co.
 - c. Hammond Valve.
 - d. Milwaukee Valve Company.
 - e. NIBCO INC.
 - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron.

2.05 IRON GATE VALVES

- A. Class 125, NRS, Iron Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-70, Type I.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - d. Ends: Flanged.
 - e. Trim: Bronze.
 - f. Disc: Solid wedge.
 - g. Packing and Gasket: Asbestos free.
- B. Class 125, OS&Y, Iron Gate Valves:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Crane Co.
 - b. Hammond Valve.
 - c. Milwaukee Valve Company.
 - d. NIBCO INC.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-70, Type I.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM A 126, gray iron with bolted bonnet.
 - d. Ends: Flanged.
 - e. Trim: Bronze.
 - f. Disc: Solid wedge.
 - g. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.03 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball or gate valves.

2. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with nonmetallic disc.
 - B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
 - C. Select valves, except wafer types, with the following end connections:
 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends or solder-joint valve-end.
 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
- 3.05 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE
- A. Pipe NPS 2 and Smaller:
 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 2. Ball Valves: Two piece, full port bronze with stainless-steel trim.
 3. Bronze Swing Check Valves: Class 125, bronze disc.
 4. Bronze Gate Valves: Class 125, NRS.
 - B. Pipe NPS 2-1/2 and Larger:
 1. Iron Ball Valves: Class 150.
 2. Iron Swing Check Valves: Class 125, nonmetallic-to-metal seats.
 3. Iron Gate Valves: Class 125, NRS and OS&Y.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe stands.
 - 6. Equipment supports.

1.02 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.03 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.02 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.
- B. The Contractor shall obtain permission from the Engineer to utilize trapeze pipe hangers and also perform all necessary calculations and detailing at each location used.

2.03 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig or ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.04 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.05 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Unless otherwise specifically indicated or hereinafter specified in the specifications, all supporting, hanging and anchoring of piping, equipment, etc., shall be performed by each trade as is necessary for completion of the work per the specifications.
- B. Supporting and hanging shall be done so that excessive load will not be placed on any one hanger so as to allow for

proper pitch and expansion of piping. Hangers and supports shall be placed as near as possible to joints, turns and branches.

- C. For concrete construction, utilize adjustable concrete inserts for fasteners. Expansion anchors and power driven devices may be used when approved in writing by the Engineer.
- D. Utilize beam clamps for fastening to steel joists and beams and expansion anchors in masonry construction.
- E. When piping is routed within joists, piping shall be top mounted on trapeze type hangers with each pipe individually clamped to trapeze hanger.
- F. Trapeze hangers are not allowed, unless specifically approved by the engineer.
- G. Install all miscellaneous steel other than designed building structural members as required to provide means of securing hangers, supports, etc., where piping does not pass directly below or cross steel joists.
- H. Piping shall not be supported by the equipment to which it is connected. Support all piping so as to remove any load or stress from the equipment.
- I. Where piping, etc., is routed vertically, approved riser clamps, brackets or other means shall be utilized at approximately 10'-0" center to center minimum and an approved adjustable base stand or fitting on concrete support base shall be utilized at the base of the vertical run.
- J. Where piping is routed along walls, knee braced angle frames or pipe brackets with saddles, clamps, and rollers (where required) mounted on structural brackets fastened to walls or columns shall be used.
- K. Support all ceiling hung equipment, with approved vibration isolators.
- L. Where copper tubing is specified, hangers shall be of copper clad type when piping is uninsulated.
- M. Uninsulated piping hung from above shall be supported with ring and clevis type pipe hangers. Uninsulated piping mounted on trapeze and wall bracket type support shall be held in place with U-bolts. U-bolts shall allow for axial movement in the piping.
- N. All insulated piping shall be supported with clevis type and pipe roll hangers. Hangers shall be sized to allow the pipe insulation to pass through the hangers. Install insulation protection saddles at all hanger locations. Welded pipe saddles shall be installed at all hangers on piping 5" and larger. The pipe saddles shall be sized for the thickness of insulation used. Hangers shall fit snugly around outside of insulation saddles.
- O. Under no conditions will perforated band iron or steel wire driven hangers be permitted.
- P. In general, support piping at the following spacing:
 - 1. Steel and copper piping - 8 foot intervals for piping 3" and smaller; 10 foot intervals for larger piping.
- Q. Where fireproofing is damaged from the building structures due to contractor's installation of hangers, clamps, etc., it shall be the contractor's responsibility to repair all dislodged/damaged fireproofing to original fire proof rating. This shall also include all work performed by the contractor's sub-contractors.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. The Contractor shall obtain permission from the Engineer to utilize trapeze pipe hangers and also perform all necessary calculations and detailing at each location used.
 - 2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 3. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:
 - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Stand Installation:
 - 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 07 Section "Roof Accessories" for curbs.
 - 3. The Contractor shall perform all necessary calculations and detailing at each location used.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
 - H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
 - I. Install lateral bracing with pipe hangers and supports to prevent swaying.
 - J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
 - K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
 - L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
 - M. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - 3. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4 and NPS 6: 18 inches long and 0.06 inch thick.
 - c. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - 4. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- 3.03 EQUIPMENT SUPPORTS
- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 - B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
 - C. Provide lateral bracing, to prevent swaying, for equipment supports.
- 3.04 METAL FABRICATIONS
- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
 - B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
 - C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.
- 3.05 ADJUSTING
- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 - B. Trim excess length of continuous-thread hanger and support rods to 1 inch.
- 3.06 PAINTING
- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
 - B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
- 3.07 HANGER AND SUPPORT SCHEDULE
- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
 - B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
 - C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
 - D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper

- tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
 - F. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
 - G. Use thermal-hanger shield inserts for insulated piping and tubing.
 - H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 7. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 8. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 9. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 10. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 11. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 12. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 13. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
 - J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
 - K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- M. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- N. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- O. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction after permission is obtained from the Engineer.
- P. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 22 05 29

SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Stencils.
 - 4. Valve tags.
 - 5. Warning tags.

1.2 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Fasteners: Stainless-steel self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.

2.2 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch Stainless steel, 0.025-inch Aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data. Provide drawing indicating location of all valves tagged.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/2 inches for ducts
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Stencil Paint: GS-11 compliant, low emitting, black paint.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
- B. Mark each lay-in ceiling panel which is nearest access to equipment, valves, etc., with a lamacoid plate located on the ceiling grid.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, round.
 - b. Hot Water: 1-1/2 inches, round.
 - c. Natural Gas: 1-1/2 inches, round.
 - 2. Valve-Tag Color: Natural
 - 3. Letter Color: Black

3.4 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping shall be according to the following chart:
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels on each piping system.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 15 feet (5m) along each run.
 - 7. On piping above removable acoustical ceilings. All piping shall be minimally identified once above all room ceilings and where it passes thru walls or floors.
- D. Pipe Label Schedule:
 - 1. Domestic Cold Water Piping: DCW
 - 2. Domestic Hot Water Piping: DHW
 - 3. Domestic Hot Water Return: RHW
 - 4. Natural Gas Piping: NG
 - 5. Sanitary Waste Piping: SAN
 - 6. Sanitary Vent Piping: VENT
 - 7. Storm Water Piping: STORM

END OF SECTION 22 05 53

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Mineral fiber.
 - 2. Insulating cements.
 - 3. Adhesives.
 - 4. Mastics.
 - 5. Lagging adhesives.
 - 6. Sealants.
 - 7. Factory-applied jackets.
 - 8. Field-applied fabric-reinforcing mesh.
 - 9. Field-applied cloths.
 - 10. Field-applied jackets.
 - 11. Tapes.
 - 12. Securements.
 - 13. Corner angles.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.05 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.06 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. Provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. CertainTeed Corp.; Commercial Board.
 - b. Johns Manville; 800 Series Spin-Glas.
 - c. Knauf Insulation; Insulation Board.
 - d. Owens Corning; Fiberglas 700 Series.
- F. Mineral-Fiber, Preformed Pipe Insulation:
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Johns Manville; Micro-Lok.
 - b. Knauf Insulation; 1000 Pipe Insulation.
 - c. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 3. Type II, 1200 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- 2.02 INSULATING CEMENTS
- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
 - B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 - C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- 2.03 ADHESIVES
- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
 - B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - D. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2.04 MASTICS
- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - 1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 4. Color: White.
 - C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 3. Solids Content: 63 percent by volume and 73 percent by weight.
 - 4. Color: White.
- 2.05 LAGGING ADHESIVES
- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment, and pipe insulation.
 - 3. Service Temperature Range: Minus 50 to plus 180 deg F.
 - 4. Color: White.
- 2.06 SEALANTS
- A. Joint Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.

2. Permanently flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 100 to plus 300 deg F.
 4. Color: White or gray.
 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Materials shall be compatible with insulation materials, jackets, and substrates.
 2. Fire- and water-resistant, flexible, elastomeric sealant.
 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 4. Color: White.
 5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2.07 FACTORY-APPLIED JACKETS
- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
- 2.08 FIELD-APPLIED CLOTHS
- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 6 oz./sq. yd..
- 2.09 FIELD-APPLIED JACKETS
- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- 2.10 TAPES
- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
 2. Thickness: 11.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
1. Width: 2 inches.
 2. Thickness: 6 mils.
 3. Adhesion: 64 ounces force/inch in width.
 4. Elongation: 500 percent.
 5. Tensile Strength: 18 lbf/inch in width.
- 2.11 SECUREMENTS
- A. Bands:
1. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 316; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
 2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
 3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.
- C. Wire: 0.080-inch nickel-copper alloy, 0.062-inch soft-annealed, stainless steel or 0.062-inch soft-annealed, galvanized steel.
- 2.12 CORNER ANGLES
- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.03 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 1. Install insulation continuously through hangers and around anchor attachments.
 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.04 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 1. Comply with requirements in Division 07 Section "Penetration Firestopping" and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
 1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.05 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers that conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.06 MINERAL-FIBER INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
3. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.
5. Install PVC jacket.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
3. Install PVC jacket.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.07 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.

3.08 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Water Piping (Hot, Recirculated):

1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inchthick.

B. Stormwater and Overflow Piping (Horizontal piping including inlet and outlet elbows) and Drain Bodies:

1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inchthick.

C. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch

END OF SECTION 22 07 00

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 ALTERNATES

- A. Domestic Water Piping Alternate: An alternate is being requested to provide all piping Copper per this specification.

1.2 SUBMITTALS

- A. Product Data: For the following products:
- B. Specialty valves.
 - 1. Backflow preventers and vacuum breakers.
 - 2. Water penetration systems.
- C. Water Samples: Specified in "Cleaning" Article.

1.3 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L and ASTM B 88, Type M water tube, drawn temper.
- B. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - 1. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
- C. Copper Pressure-Seal-Joint Fittings:
- D. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

- 1. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

2.3 PEX TUBE AND FITTINGS

- A. PEX-a TUBE: ASTM F876, SDR 9 manufactured using the Engel-method provided with 15 year standard factory warranty.
 - 1. Cold-expansion Fittings: ASTM F877 and ASTM F1960, lead-free brass or engineered polymer (EP) fittings utilizing cold-expansion PEX-a reinforcing rings.
 - 2. Metal to PEX Transition Fittings:
 - a. Flanges: ASME B16.5, Class 150, with ASTM F1960 cold-expansion end.
 - b. Groove Adapter: One CSA B242-05 groove end and one ASTM F1960 cold-expansion end.
 - c. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Uponor.
 - 3. Plastic to Plastic Transition Fittings:
 - a. CPVC Adapter: One ASTM D2846 CPVC SDR11 end and one ASTM F1960 cold-expansion end.
 - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Uponor.

2.4 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.5 TRANSITION FITTINGS

- A. General Requirements:
 - 1. Same size as pipes to be joined.
 - 2. Pressure rating at least equal to pipes to be joined.
 - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- C. Sleeve-Type Transition Coupling: AWWA C219.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cascade Waterworks Manufacturing.
 - b. Dresser, Inc.; Dresser Piping Specialties.

- c. Ford Meter Box Company, Inc. (The).
- d. JCM Industries.
- e. Romac Industries, Inc.
- f. Smith-Blair, Inc; a Sensus company.
- g. Viking Johnson; c/o Mueller Co.

2.6 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. EPCO Sales, Inc.
 - d. Hart Industries International, Inc.
 - e. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - f. Zurn Plumbing Products Group; Wilkins Water Control Products.
 - 2. Description:
 - a. Pressure Rating: 150 psig at 180 deg F.
 - b. End Connections: Solder-joint copper alloy and threaded ferrous.

2.7 FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Flex-Hose Co., Inc.
 - 2. Flexicraft Industries.
 - 3. Metraflex, Inc.
 - 4. Unaflex, Inc.
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - 1. Working-Pressure Rating: Minimum 200 psig.
 - 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 - 1. Working-Pressure Rating: Minimum 200 psig.
 - 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 - 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
- D. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.
- E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- F. Install PEX tubing under building slab according to the "Uponor Commercial Piping Pocket Guide" (2017) and AWWA C904.
- G. Install shutoff valve immediately upstream of each dielectric fitting.
- H. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
- I. Install domestic water piping level without pitch and plumb.
- J. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

- K. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- L. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- M. Install piping adjacent to equipment and specialties to allow service and maintenance.
- N. Install piping to permit valve servicing.
- O. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
- P. Install piping free of sags and bends.
- Q. Install fittings for changes in direction and branch connections.
- R. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- S. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.
- T. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
- U. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.
- V. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- W. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- X. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."
- Y. Do not install piping in a method that's subject to freezing.
- Z. PEX piping shall be installed per ASTM E84 requirements for plenum applications. Insulate joints with fiberglass wrap and install all PEX-a pipe support and provide all required hangers and supporting strapping as required by manufacturer to provide a code compliant installation.

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 1. Apply appropriate tape or thread compound to external pipe threads.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
- E. Soldered Joints: Solder Joints shall be limited on this project. Copper fittings shall be Pressure-Seal-Joint Fittings where possible. Standard sweat fitting are not allowed. Where required, apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
- F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- H. PEX-Tubing Joints: Join PEX tube and fittings according to ASTM F1960 and the "Uponor Commercial Piping Pocket Guide" (2017).
- I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.3 VALVE INSTALLATION

- A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.
- B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball valves for piping NPS 2 and smaller. Use ball or gate valves for piping NPS 2-1/2 and larger.
- C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."
 1. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
- D. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

- 3.4 TRANSITION FITTING INSTALLATION
 - A. Install transition couplings at joints of dissimilar piping.
 - B. Transition Fittings in Underground Domestic Water Piping:
 - 1. NPS 1-1/2 and Smaller: Fitting-type coupling.
 - 2. NPS 2 and Larger: Sleeve-type coupling.
- 3.5 DIELECTRIC FITTING INSTALLATION
 - A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings.
 - C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.
- 3.6 FLEXIBLE CONNECTOR INSTALLATION
 - A. Install flexible connectors in suction and discharge piping connections to each domestic water pump.
 - B. Install bronze-hose flexible connectors in copper domestic water tubing.
 - C. Install stainless-steel-hose flexible connectors in steel domestic water piping.
- 3.7 HANGER AND SUPPORT INSTALLATION
 - A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet If Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
 - B. Support vertical piping and tubing at base and at each floor.
 - C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
 - D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 - 6. NPS 6: 10 feet with 5/8-inch rod.
 - 7. NPS 8: 10 feet with 3/4-inch rod.
 - E. Install supports for vertical copper tubing every 10 feet.
 - F. Install hangers for PEX tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.
 - 2. NPS 1-1/4 to NPS 3: 48 inches with 3/8-inch rod.
 - 3. NPS 3/4 and Smaller: 72 inches with 3/8-inch rod when continuously supported.
 - 4. NPS 1 to NPS 3: 96 inches with 3/8-inch rod when continuously supported.
 - G. Install supports for vertical PEX tubing:
 - 1. Every 5 feet.
 - 2. At the base and at each floor, as well as:
 - a. At the top of every-other floor for hot water risers.
 - b. At the top of every-fourth floor for cold water risers.
 - H. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.
- 3.8 CONNECTIONS
 - A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Install piping adjacent to equipment and machines to allow service and maintenance.
 - C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
 - D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - 1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
 - 2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
 - 4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.9 IDENTIFICATION

- A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

3.10 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Piping Inspections:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - 3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - 4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- C. Piping Tests:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - 3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - 6. Prepare reports for tests and for corrective action required.
- D. Domestic water piping will be considered defective if it does not pass tests and inspections.

3.11 ADJUSTING

- A. Perform the following adjustments before operation:
 - 1. Close drain valves, hydrants, and hose bibbs.
 - 2. Open shutoff valves to fully open position.
 - 3. Open throttling valves to proper setting.
 - 4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
 - 5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
 - 6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
 - 7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
 - 8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.12 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

- d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
 - B. Clean non-potable domestic water piping as follows:
 - 1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - C. Prepare and submit reports of purging and disinfecting activities.
 - D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.
- 3.13 PIPING SCHEDULE
- A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
 - C. Under-building-slab, domestic water, building-service piping, NPS 3 and smaller, shall be the following:
 - 1. HDPE, with fusion-welded joints.
 - 2. PEX tube, ASTM F876, SDR 9; ASTM F1960 lead-free brass or engineered polymer cold-expansion fittings; and cold-expansion joints with PEX-a reinforcing rings.
 - D. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:
 - 1. Hard copper tube, ASTM B 88, Type L; wrought- copper solder-joint fittings; and soldered joints.
 - 2. PEX tube, ASTM F876, SDR 9; ASTM F1960 lead-free brass or engineered polymer cold-expansion fittings; and cold-expansion joints with PEX-a reinforcing rings.
 - E. Aboveground domestic water piping, NPS 2-1/2 and above; shall be the following:
 - 1. Hard copper tube, ASTM B 88, Type L; grooved-joint, copper-tube appurtenances; and grooved joints.
 - 2. PEX tube, ASTM F876, SDR 9; ASTM F1960 lead-free brass or engineered polymer cold-expansion fittings; and cold-expansion joints with PEX-a reinforcing rings.
- 3.14 VALVE SCHEDULE
- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use ball valves for piping NPS 2 and smaller. Use ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
 - 2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use ball valves with flanged ends for piping NPS 2-1/2 and larger.
 - 3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
 - 4. Drain Duty: Hose-end drain valves.
 - B. Use check valves to maintain correct direction of domestic water flow to and from equipment.
 - C. Iron grooved-end valves may be used with grooved-end piping.

END OF SECTION 22 11 16

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following domestic water piping specialties:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Water pressure-reducing valves.
 - 4. Balancing valves.
 - 5. Drain valves.
 - 6. Water hammer arresters.
 - 7. Trap-seal primer valves.
 - 8. Trap-seal primer systems.

1.02 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. NSF Compliance:
 - 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.
 - 2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.01 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work. Standard: ASSE 1001.
 - 2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
 - 3. Body: Bronze.
 - 4. Inlet and Outlet Connections: Threaded.
 - 5. Finish: Chrome plated.

2.02 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Principle Backflow Preventers
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Conbraco Industries, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Wilkins
 - d. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1013.
 - 3. Operation: Continuous-pressure applications.
 - 4. Body: Bronze
 - 5. Accessories:
 - a. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
 - b. Strainers.

2.03 WATER PRESSURE-REDUCING VALVES

- A. Water Regulators
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. Honeywell Water Controls.

- d. Watts Industries, Inc.; Water Products Div.
 - e. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1003.
 - 3. Pressure Rating: Initial working pressure of 150 psig.
 - 4. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
 - 5. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.
- 2.04 BALANCING VALVES
- A. Copper-Alloy Calibrated Balancing Valves:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong International, Inc.
 - b. ITT Industries; Bell & Gossett Div.
 - c. NIBCO INC.
 - d. Taco, Inc.
 - e. Watts Industries, Inc.; Water Products Div.
 - 2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
 - 3. Body: Brass or bronze,
 - 4. Size: Same as connected piping, but not larger than NPS 2.
 - 5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.
- 2.05 OUTLET BOXES
- A. Clothes Washer Outlet Boxes:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Guy Gray Manufacturing Co., Inc.
 - c. Oatey.
 - d. Plastic Oddities; a division of Diverse Corporate Technologies.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Whitehall Manufacturing; a div. of Acorn Engineering Company.
 - g. Zurn Plumbing Products Group; Light Commercial Operation.
 - 3. Mounting: Recessed.
 - 4. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
 - 5. Faucet: Combination, valved fitting or separate hot- and cold-water, valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
 - 6. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
 - 7. Drain: NPS 2 standpipe and P-trap for direct waste connection to drainage piping.
 - 8. Inlet Hoses: Two 60-inch-long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
 - 9. Drain Hose: One 48-inch-long, rubber household clothes washer drain hose with hooked end.
 - B. Ice maker/coffee maker Outlet Boxes:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Guy Gray Manufacturing Co., Inc.
 - c. LSP Products Group, Inc.
 - d. Oatey.
 - e. Plastic Oddities; a division of Diverse Corporate Technologies.
 - 3. Mounting: Recessed.
 - 4. Material and Finish: Enameled-steel or epoxy-painted-steel or plastic box and faceplate.
 - 5. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
 - 6. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.
- 2.06 HOSE BIBBS
- A. Hose Bibbs HB: Refer to Drawing Schedule.
- 2.07 WALL HYDRANTS
- A. Refer to Drawing Schedule.

2.08 DRAIN VALVES

- A. Ball-Valve-Type, Hose-End Drain Valves:
 - 1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
 - 2. Pressure Rating: 400-psig minimum CWP.
 - 3. Size: NPS 3/4.
 - 4. Body: Copper alloy.
 - 5. Ball: Chrome-plated brass.
 - 6. Seats and Seals: Replaceable.
 - 7. Handle: Vinyl-covered steel.
 - 8. Inlet: Threaded or solder joint.
 - 9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.09 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. PPP Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 3. Standard: ASSE 1010 or PDI-WH 201.
 - 4. Type: Metal bellows.
 - 5. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.10 AIR VENTS

- A. Bolted-Construction Automatic Air Vents:
 - 1. Body: Bronze.
 - 2. Pressure Rating: 125-psig minimum pressure rating at 140 deg F.
 - 3. Float: Replaceable, corrosion-resistant metal.
 - 4. Mechanism and Seat: Stainless steel.
 - 5. Size: NPS 3/8 minimum inlet.
 - 6. Inlet and Vent Outlet End Connections: Threaded.

2.11 TRAP-SEAL PRIMER VALVES

- A. Drainage-Type, Trap-Seal Primer Valves:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - b. Zurn Plumbing Products Group
 - 2. Standard: ASSE 1044, lavatory P-trap with NPS 3/8 minimum, trap makeup connection.
 - 3. Size: NPS 1-1/4 minimum.
 - 4. Material: Chrome-plated, cast brass.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 - 1. Locate backflow preventers in same room as connected equipment or system.
 - 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
 - 3. Do not install bypass piping around backflow preventers.
- C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.
- D. Install balancing valves in locations where they can easily be adjusted.

- E. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."
 - F. Install water hammer arresters in water piping according to PDI-WH 201.
 - G. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.]
 - H. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.
 - I. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.
- 3.02 CONNECTIONS
- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.
- 3.03 LABELING AND IDENTIFYING
- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Pressure vacuum breakers.
 - 2. Reduced-pressure-principle backflow preventers.
 - 3. Water pressure-reducing valves.
 - 4. Calibrated balancing valves.
 - 5. Outlet boxes.
 - 6. Trap-seal primer systems.
 - B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."
- 3.04 FIELD QUALITY CONTROL
- A. Perform the following tests and prepare test reports:
 - 1. Test each pressure vacuum breaker reduced-pressure-principle backflow preventer according to authorities having jurisdiction and the device's reference standard.
 - B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.
- 3.05 ADJUSTING
- A. Set field-adjustable pressure set points of water pressure-reducing valves.
 - B. Set field-adjustable flow set points of balancing valves.
 - C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 11 19

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.
 - 3. Encasement for underground metal piping.
 - 4. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.02 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. LLDPE: Linear, low-density polyethylene plastic.
- D. NBR: Acrylonitrile-butadiene rubber.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.
- H. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.03 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class(es).
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.04 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - 1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - a. Available Manufacturers:
 - 1) ANACO.
 - 2) Fernco, Inc.
 - 3) Ideal Div.; Stant Corp.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.

2.05 PVC & CPVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
- B. Solvent Cement and Adhesive Primer:
 - 1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Refer to the Geotechnical Report for specific requirements related to the installation of underground piping. If specific information related to utility trenching and backfilling is provided in the Geotechnical Report, the Geotechnical Report shall take precedence over this specification.

3.02 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms other than at footings.
 - b. 12 inches outside of concrete forms at footings.
 - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - d. 6 inches beneath bottom of concrete slabs-on-grade.
 - e. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.03 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe.
- C. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.04 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice but not before completing the following.
 - 1. Testing and inspecting underground utilities.
 - 2. Removing trash and debris.
- B. Place and compact bedding course on trench bottoms. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."
- D. Trenches under Roadways: Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Miscellaneous Cast-in-Place Concrete."
- E. Backfill voids with satisfactory soil while removing shoring and bracing.
- F. Place and compact initial backfill of bed sand or subbase material in 6 inch lifts, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

3.05 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground, soil and waste piping shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel and rigid, unshielded couplings; and hubless-coupling joints.
- C. Aboveground, vent piping shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel and rigid, unshielded couplings; and hubless-coupling joints.
- D. Underground, soil, waste, and vent piping shall be any of the following:
 - 1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

2. Schedule 40 PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Schedule 40 CPVC pipe, CPVC socket fitting, and solvent-cemented joints for Grease Waste

3.06 PIPING INSTALLATION

- A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."
- B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- E. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- H. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 1. Building Sanitary Drain: 1/8" slope per foot in direction of flow for all below and above slab piping.
 2. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- I. Install engineered soil and waste drainage and vent piping systems as follows:
 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
 2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.
 3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.
- J. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- K. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- L. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- N. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- O. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
- P. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.07 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- D. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.08 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 2. Install individual, straight, horizontal piping runs according to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- C. Support vertical piping and tubing at base and at each floor.

- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
 - E. Install hangers for cast-iron soil and vent piping with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 4. NPS 6: 60 inches with 3/4-inch rod.
 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
 - F. Install supports for vertical cast-iron soil piping every 15 feet.
 - G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.
- 3.09 CONNECTIONS
- A. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
 - C. Connect drainage and vent piping to the following:
 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
- 3.10 FIELD QUALITY CONTROL
- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
 - C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 - D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 6. Prepare reports for tests and required corrective action.
- 3.11 CLEANING
- A. Clean interior of piping. Remove dirt and debris as work progresses.
 - B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
 - C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Cleanouts.
 - 2. Floor drains.
 - 3. Roof flashing assemblies.
 - 4. Miscellaneous sanitary drainage piping specialties.
- B. Related Sections include the following:
 - 1. Division 22 Section "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.
 - 2. Division 22 Section "Plumbing Fixtures" for hair interceptors.

1.02 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FRP: Fiberglass-reinforced plastic.
- C. PVC: Polyvinyl chloride plastic.

1.03 SUBMITTALS

- A. Field quality-control test reports.
- B. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.05 COORDINATION

- A. Coordinate size and location of roof penetrations.
- B. Coordinate pipe routing with Division 21, 23, 26 & 27 Trades

PART 2 - PRODUCTS

2.01 CLEANOUTS

- A. Exposed Metal Cleanouts:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
 - 2. Standard: ASME A112.36.2M for cast iron ASME A112.3.1 for stainless steel for cleanout test tee.
 - 3. Size: Same as connected drainage piping
 - 4. Body Material: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
 - 5. Closure: Countersunk, brass plug.
 - 6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 - 7. Closure: Stainless-steel plug with seal with round top.
- B. Metal Floor Cleanouts:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. Oatey.
 - c. Sioux Chief Manufacturing Company, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.
 - f. Watts Drainage Products Inc.
 - g. Zurn Plumbing Products Group; Light Commercial Operation.
 - h. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M for heavy-duty, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Heavy-duty, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Required.
7. Outlet Connection: Threaded.
8. Closure: Brass plug with straight threads and gasket.
9. Adjustable Housing Material: Cast iron with threads.
10. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Heavy Duty.
13. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Tyler Pipe; Wade Div.
 - e. Watts Drainage Products Inc.
 - f. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
5. Closure: Countersunk, drilled-and-threaded brass plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, deep, chrome-plated bronze cover plate with screw.
8. Wall Access: Round, nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.

2.02 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - d. Watts Drainage Products Inc.
 - e. Zurn Plumbing Products Group.

2.03 TRENCH DRAINS

A. Trench Drains:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Schluter

2.04 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains or Open Receptacles (Referenced as OR's on drawings):

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping.

B. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

C. Stack Flashing Fittings:

1. Description: Counterflashing-type, cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

2.05 FLASHING MATERIALS

- A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
 - 2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
 - 3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.
- B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:
 - 1. General Applications: 12 oz./sq. ft. thickness.
 - 2. Vent Pipe Flashing: 8 oz./sq. ft. thickness.
- C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 hot-dip galvanized, mill-phosphatized finish for painting if indicated.
- D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil minimum thickness.
- E. Fasteners: Metal compatible with material and substrate being fastened.
- F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- G. Solder: ASTM B 32, lead-free alloy.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.06 MOTORS

- A. General requirements for motors are specified in Division 22 Section "Common Motor Requirements for Plumbing Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.
 - 2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
 - b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
 - c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- G. Assemble open drain fittings and install with top of hub 2 inches above floor.
- H. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
 - 2. Size: Same as floor drain inlet.
- I. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.02 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.

3.03 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.
 - 2. Copper Sheets: Solder joints of copper sheets.
- B. Set flashing on floors and roofs in solid coating of bituminous cement.
- C. Secure flashing into sleeve and specialty clamping ring or device.
- D. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

3.04 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 34 00 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Commercial, gas-fired, high-efficiency, domestic-water heaters.
 - 2. Domestic-water heater accessories.

1.2 PERFORMANCE REQUIREMENTS

1.3 SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 1. Product Data for Prerequisite EA 2: Documentation indicating that units comply with ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.
- C. Product Certificates: For each type of commercial, gas-fired, domestic-water heater, from manufacturer.
- D. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.
- E. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA 90.1 Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

1.5 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Five years.
 - 2) Controls and Other Components: Five years.

PART 2 - PRODUCTS

- A. Commercial, Electric, High-Efficiency, Storage, Domestic-Water Heaters:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. AERCO International, Inc.
 - b. Ajax Boiler Inc.
 - c. Bradford White Corporation.
 - d. Lochinvar Corporation.
 - e. Rheem Manufacturing Company.
 - f. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
 - g. State Industries.
 - 2. Standard: ANSI Z21.10.3/CSA 4.3.
 - 3. Description: Manufacturer's proprietary design to provide at least 95 percent combustion efficiency at optimum operating conditions.
 - 4. Factory-Installed Storage-Tank Appurtenances:
 - a. Anode Rod: Replaceable magnesium.
 - b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
 - c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.

- d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
- e. Jacket: Steel with enameled finish.
- f. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for gas-fired, high-efficiency, domestic-water heaters and natural-gas fuel.
- g. Temperature Control: Adjustable thermostat.
- h. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
- i. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics: Refer to drawings for capacity and characteristics.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

- A. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.
- B. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.
- C. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include pressure rating as required to match gas supply.
- D. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.
- E. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
 - 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

2.3 SOURCE QUALITY CONTROL

- A. Hydrostatically test commercial domestic-water heaters and storage tanks to minimum of one and one-half times pressure rating before shipment.
- B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and reinspecting requirements and Division 01 Section "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete ."
 - 1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 - 2. Maintain manufacturer's recommended clearances.
 - 3. Arrange units so controls and devices that require servicing are accessible.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 8. Anchor domestic-water heaters to substrate.
 - 9. Provide drain pan between tank and concrete.
- B. Install gas-fired, domestic-water heaters according to NFPA 54.
 - 1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
 - 2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 - 3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
 - 4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Division 23 Section "Facility Natural-Gas Piping."

- C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Division 22 Section "Domestic Water Piping Specialties."
- E. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Division 22 Section "Meters and Gages for Plumbing Piping."
- F. Assemble and install inlet and outlet piping manifold kits for multiple domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each domestic-water heater outlet. Comply with requirements for valves specified in Division 22 Section "General-Duty Valves for Plumbing Piping," and comply with requirements for thermometers specified in Division 22 Section "Meters and Gages for Plumbing Piping."
- G. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.
- H. Fill domestic-water heaters with water.

3.2 CONNECTIONS

- A. Comply with requirements for domestic-water piping specified in Division 22 Section "Domestic Water Piping."
- B. Drawings indicate general arrangement of piping, fittings, and specialties.
- C. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Domestic-water heaters will be considered defective if they do not pass tests and inspections. Comply with requirements in Division 01 Section "Quality Requirements" for retesting and reinspection requirements and Division 01 Section "Execution" for requirements for correcting the Work.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters.

END OF SECTION 22 34 00

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

1.02 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
 - 1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" for plumbing fixtures for people with disabilities.
- C. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- D. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- E. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- F. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - 1. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
 - 2. Vitreous-China Fixtures: ASME A112.19.2M.
 - 3. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
 - 4. Water-Closet, Flushometer Tank Trim: ASSE 1037.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES AND TRIM

- A. Refer to fixture schedule on drawings for fixture and trim requirements.
- B. Available Manufacturers:
 - 1. Vitreous China: ASME A112.19.2M
 - a. American Standard, Sloan, Kohler
 - 2. Water Closet Seats:
 - a. Bemis
 - b. Church
 - c. Toto
 - 3. Stainless Steel Drop-in Sinks:
 - a. Elkay
 - b. Just
 - 4. Service Sinks:
 - a. Fiat
 - b. Acorn
 - c. Mustee
 - d. Zurn
 - 5. Tub Sinks:
 - a. Eagle
 - b. Elkay
 - 6. Flush Valve Fixtures:
 - a. American Standard, Sloan
 - 7. Lavatory Faucets:
 - a. American Standard, Sloan
 - 8. Service Faucets:
 - a. Chicago Faucet
 - b. Moen Commercial
 - c. Symmons
 - 9. Water Coolers:
 - a. Elkay
 - b. Halsey Taylor
 - c. Oasis

10. Wall Hydrants:
 - a. Myfab
 - b. Wade
 - c. Zurn
11. Emergency/Safety Fixtures:
 - a. Bradley Galvanized with PVC Coating
12. Appliance Connection Boxes:
 - a. Guy Gray
 - b. Oatley
 - c. Wolverine
13. Fixture Carriers and Supports:
 - a. Josam
 - b. Zurn
 - c. Wade
 - d. Smith
 - e. Watts
 - f. MIFAB, Inc.
14. P-trap Insulation covering for ADA Fixtures
 - a. IPS Corp.
 - b. McGuire
 - c. Plumberex.
15. P-traps, Tailpieces, and Escutcheons:
 - a. McGuire
16. Water supplies and stops:
 - a. American Standard
 - b. Elkay
 - c. Kohler
 - d. McGuire
 - e. Moen Commercial
 - f. Nibco
 - g. Sloan
 - h. Watts
 - i. Zurn,
17. Showers:
 - a. Bradley
 - b. Symmons
18. Wash Fountains:
 - a. Bradley
 - b. Acorn
 - c. Willoughby

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

- G. Install counter-mounting fixtures in and attached to casework.
 - H. Install fixtures level and plumb according to roughing-in drawings.
 - I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
 - J. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
 - K. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
 - L. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
 - M. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
 - N. Install toilet seats on water closets.
 - O. Install trap-seal liquid in dry urinals.
 - P. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
 - Q. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
 - R. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
 - S. Install shower flow-control fittings with specified maximum flow rates in shower arms.
 - T. Install traps on fixture outlets.
 - 1. Exception: Omit trap on fixtures with integral traps.
 - 2. Exception: Omit trap on indirect wastes, unless otherwise indicated.
 - U. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Escutcheons for Plumbing Piping."
 - V. Set service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."
 - W. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."
- 3.03 CONNECTIONS
- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- 3.04 ADJUSTING
- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
 - B. Replace washers and seals of leaking and dripping faucets and stops.
 - C. Install fresh batteries in sensor-operated mechanisms.
- 3.05 CLEANING
- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - 1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - 2. Remove sediment and debris from drains.
 - B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.
- 3.06 PROTECTION
- A. Provide protective covering for installed fixtures and fittings.
 - B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 40 00

SECTION 23 00 00 - COMMON MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes common requirements for the entire project.

1.02 GENERAL

- A. All manufacturers, suppliers, fabricators, contractors, etc. submitting proposals to any part if for work, services, materials or equipment to be used on or applied to this project are hereby directed to become familiar with all documents pertinent to this Contract. In case of conflict between these Common Mechanical Requirements and the General and/or Special Conditions, the affected Contractor shall contact the Architect/Engineer for clarification 10 days prior to bid for clarification.
- B. Each Proposer shall also be governed by any unit prices and Addenda insofar as may affect the work or services.
- C. The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s) indicated or specified in the Contract Documents.
- D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.
- E. It is not the intent of this section of the specifications to make any Contractor, other than the General Contractor (or Construction Manager, if applicable), responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the General Contractor to the Architect (if applicable), then to the Engineer.
- F. This section of the specifications shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the General Contractor (or Construction Manager, if applicable).
- G. It is the intent of this Contract to deliver to the Owner a new and complete project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.
- H. In general, and to the extent possible, all work shall be accomplished without interruption of facility operations. The Contractor shall advise the Owner at least forty-eight (48) hours prior to the interruption of any services (gas, water, HVAC, etc.). The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.
- I. Each proposer shall give written notice to the Architect/Engineer 10 days prior to the submission of a proposal of any materials or apparatus believed inadequate or unsuitable; in violation of codes, laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system without additional cost to the Owner.

1.03 INTENT

- A. It is the intention of the Contract Documents to call for finished work, tested and ready for operation.
- B. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

1.04 DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items are required without additional cost to the Owner and submit their bid accordingly.
- B. The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. This also includes potential conflicts with regards to equipment and material model numbers, part numbers, etc. and respective description and/or performance. Should this condition exist, the Proposer shall request a clarification not less than 10 days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final and without additional cost to the Owner.
- C. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

- D. Contractor shall make all necessary and required measurements in the field and shall be responsible for correct fitting. The work shall be coordinated with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- E. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project. Unless a formal proposal request is issued, this work shall be performed without additional cost to the Owner.
- F. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume to be relieved of the work until instructions in writing are received from the Engineer.
- G. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.
- H. Each Proposer shall review all construction drawings including Architectural, Mechanical, Electrical, Fire Protection, Landscaping, Structural, Surveys, etc., to insure that the work does not encroach or conflict with or affect the work of others in any way. Where such a condition does occur it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict prior to the submission of his proposal.
- I. Each Proposer shall in particular insure that there is adequate space to install the equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without additional expense to the Owner and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to insure adequate spaces.
- J. Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
- K. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work without additional cost to the Owner, the same as if herein specified or indicated.
- L. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.
- M. Each Proposer shall always check ceiling heights indicated on Architectural Documents and insure they can be installed appropriately and that they may be maintained after all mechanical and electrical equipment is installed. Do not install equipment in the affected area until the conflict is resolved.

1.05 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests approval of materials and/or equipment of different physical size, weight, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc.
- B. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall compensate them for all necessary changes in their work. Any drawings, specifications, diagram, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense.
- C. Review of shop drawings, submittals, etc. by the Engineer does not in any way absolve the Contractor of the responsibilities of equipment and materials substitutions or deviations.
- D. Even with any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the preceding provisions are met.
- E. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineer.
- F. Each Proposer shall furnish along with the proposal a list of requested equipment and materials which is to be provided. Where several makes are mentioned in the specifications and the Contractor fails to state which they propose to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not insure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings are satisfactorily comparable to the items specified and/or indicated.
- G. Each proposer shall give written notice to the Architect/Engineer 5 days prior to the submission of a proposal of any materials or apparatus believed inadequate or unsuitable; in violation of codes, laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers

signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system without additional cost to the Owner.

1.06 EXAMINATION OF SITE AND CONDITIONS

- A. Each Proposer shall be responsible for the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work.
- B. Each Proposer shall also be responsible with all conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of utilities, etc.
- C. The proposal shall cover all expenses or disbursements in connection with such matters and conditions in the Contract. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

1.07 QUALIFICATIONS OF CONTRACTOR AND TRADESMEN

- A. The installation of all Automatic Sprinkler Systems shall be performed by a specialized contractor normally engaged in such services and in accordance with current State Law.
- B. The installation of all Electrical Work shall be performed by licensed electricians and in accordance with current State Law.

1.08 SUPERVISION OF WORK

- A. The Contractor shall personally supervise the work for which they are responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act on behalf of the Contractor.

1.09 MATERIALS AND WORKMANSHIP

- A. All equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. Each Proposer shall determine that the materials and/or equipment he proposes to furnish can be brought into the building(s) and installed within the space available. In certain cases, it may be necessary to remove and replace walls, floors and/or ceilings and this work shall be the responsibility of the Contractor. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement of filters, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s). Insure, through coordination that no other Contractor seals off access to space required for equipment materials, etc.
- B. Use extreme care in the selection of equipment and its installation to insure that noise and vibration are kept at a minimum. The Engineer's determination shall be final and corrections to such discrepancies shall be made at the cost of the Contractor.
- C. Each length of pipe, fitting, trap, fixture and device used in the plumbing or drainage systems shall be stamped or indelibly marked with the weight or quality thereof and with the manufacturer's mark or name.
- D. All equipment shall bear the manufacturer's name and address. All electrically operated equipment shall bear a data plate indicating required horsepower, voltage, phase and ampacity. Pumps shall have a data plate indicating horsepower, static pressure head and flow rate.

1.10 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The Contractor shall give full cooperation to all other trades and shall furnish in writing with copies to the Engineer, any information necessary to permit the work of other trades to be installed satisfactorily and with the least possible interference or delay.
- B. Where any work is to be installed in close proximity to, or will interfere with work of other trades, each shall cooperate in working out space conditions to make a satisfactory adjustment without additional charge.
 - 1. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than $\frac{1}{4}'' = 1'-0''$, clearly indicating how his work is to be installed in relation to the work of other trades, or so as not to cause any interference with work of other trades. The necessary changes in his work to correct the condition shall be installed without additional charge.
- C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

1.11 CLEANING

- A. The Contractor shall, at all times, keep the area of their work presentable to the public and clean of rubbish and debris caused by operations; and at the completion of the work, shall remove all rubbish, debris, all of his tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use.
- B. If the Contractor does not attend to cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor.
- C. The Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of the Contractor's rubbish or debris.
- D. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of piping, equipment, fixtures and all other associated or adjacent fabrication.
- E. Ductwork and piping shall be kept clean at all times. Ductwork stored on the job site shall be placed a minimum of 4" above the floor and shall be completely covered in plastic. Installed ductwork shall be protected with plastic. Do not install

the ductwork if the building is not "dried-in". If this is required, the entire lengths of duct shall be covered in plastic to protect. The Owner/Engineer shall periodically inspect that these procedures are followed. If deemed unacceptable, the Contractor shall be required to clean the duct system utilizing a NADCA certified Contractor. Refer to ductwork specification for other requirements.

1.12 CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.

- A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, taps, tap fees, extensions, etc. in connection with his work.
- B. The Contractor shall file all necessary plans, pay necessary fees, prepare all documents and obtain all necessary approvals of all governmental departments and/or the appropriate municipality or utility company having jurisdiction, whether indicated or specified or not. This shall include boiler submittals, kitchen range hood submittals, plumbing submittals, health department submittals, fuel oil submittals etc.
- C. The Contractor shall obtain all required certificates of inspection for the work and deliver same to the Engineer before request for acceptance and final payment for the work.
- D. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall be versed in all Codes, Rules and Regulations pertinent to the work prior to submission of a proposal.
- E. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.
- F. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.
- G. All materials and equipment so indicated and all equipment and materials for the electrical portion of the mechanical systems shall bear the approval label of, or shall be listed by the Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable.
- H. All plumbing work is to be constructed and installed in accordance with applicable codes, plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Department of Health. Plumbing work shall not commence until such plans are in the possession of the Plumbing Contractor and on the job site.
- I. All Heating, Ventilation and Air Conditioning work shall be accomplished in accordance with the Building Code and amendments thereto, the latest standards recognized by the American Society of Heating, Refrigerating and Air Conditioning and the National Fire Protection Association.
- J. The Contractor shall furnish three (3) copies of all Final Inspection Certificates obtained to the Engineer when work is complete. Final payment for work will be contingent upon compliance with this requirement.
- K. Where minimum code requirements are exceeded in the Design, the Design shall govern.
- L. The Contractor shall insure that the work is accomplished in accordance with the OSHA Standards.
- M. All work relating to the handicapped shall be in accord with regulations currently enforced by the Authority Having Jurisdiction.
- N. All work in relation to domestic water systems shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company.
- O. All work in relation to the installation of sanitary or storm sewers shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company.
- P. Discharge of any toxic, odorous or otherwise noxious materials, refrigerants, etc. into the atmosphere or any system shall be subject to regulations of the Environmental Protection Agency (EPA) and/or the local air pollution control commission. If in doubt, contact the authority having jurisdiction (AHJ).
- Q. All pressure vessel installations shall comply with the State, and/or Federal Code applicable. A Certificate of Final Boiler Inspection shall be required.
- R. All work in conjunction with a natural gas installation shall, in addition to all other Codes, Rules, Regulations, Standards, etc., comply with the requirements of the local gas supplier and/or standards and recommendations of the American Gas Association.

1.13 RECORD DRAWINGS

- A. The Contractor shall insure that any deviations from the Design as they occur are recorded in red, erasable pencil on record drawings kept at the jobsite. Keep information in a set of drawings set aside at the job site especially for this purpose and deliver to the Engineers upon completion of the work.
- B. The Engineer shall review the record documents from time to time to insure compliance with this specification. Compliance shall be a contingency of final payment.
- C. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems.
- D. Pay particular attention to deviations in the control systems and all exterior utilities.

- E. All underground utilities/piping installed as part of this project shall be surveyed by a land surveyor licensed in the State the project is being constructed. The survey shall be furnished on a compact disc in AutoCAD “.dwg” format and “.pdf” format. Also furnish one Mylar copy.
- 1.14 TEMPORARY SERVICES
- A. The Contractor shall arrange any temporary water, electrical and other services which may be required to accomplish the work. The Contractor shall not rely on the permanent services of the Project for their use as temporary services during construction. Refer also to General and Special Conditions.
- 1.15 TEMPORARY USE OF EQUIPMENT
- A. The permanent heating and plumbing equipment, when installed, may be used for temporary services, with the consent of the Engineer. Should the permanent systems be used for this purpose the Contractor shall make all temporary connections required at their expense. The Contractor shall also make any replacement required due to damage wear and tear, etc., leaving the same in new condition.
- B. Permission to use the permanent equipment does not relieve the Contractor from the responsibility for any damages to the building construction and/or equipment which might result because of its use.
- C. A pre-start-up conference shall be held with the Architect, Owner, General Contractor and the Mechanical Contractor. Equipment shall not be started until after this meeting.
- D. During all phases of construction:
1. Air Handling Units:
 - a. At a minimum, four complete sets of filter media are required for each unit. In each unit, install two sets of filter media during construction (more shall be required if construction activities dictate more frequent changes). In each unit, install one set of filter media at substantial completion. Leave one set of filter media in boxes in appropriate mechanical room as a spare set for the Owner. All other filters shall be used by the Contractor during construction. Dispose of all construction filter media.
 - b. On the outside of all return air openings install a minimum of two sets of fiberglass filter media, such as cheesecloth, to be utilized as pre-filters for the “construction” filters. Install first set upon start-up and then install second set when first set is dirty. Dispose of all dirty construction filters. Change filters as often as necessary to keep units from becoming dirty at no additional cost.
 - c. At substantial completion of the project the entire unit shall be cleaned to present a like “new” unit for the Owner and all filters shall be replaced with new.
 - E. The contractor shall be allowed to use the above mentioned units and its associated ductwork provided the following conditions are met:
 1. The return air ductwork main shall be disconnected above the ceiling to utilize the space above the ceiling as a plenum during construction. This shall prevent the return air ductwork from being used.
 2. Pleated fiberglass filter media (25% efficient) shall be installed at all of the inlets of each air handling unit. A differential pressure gauge shall be installed and the filter media shall be changed whenever a 1.0” wg pressure differential is present across the filter media. This shall be reviewed and recorded daily by the Contractor. The contractor is responsible for any temporary duct modifications as required to install the filter media.
 3. The Contractor shall replace all filter media with new and connect all ductwork to the units prior to the start of balancing any duct systems.
 4. Upon completion of the project the entire unit shall be cleaned to present a like “new” unit for the owner and all filters shall be replaced with new.
- 1.16 SURVEY, MEASUREMENTS AND GRADE
- A. The Contractor shall lay out the work and be responsible for all necessary lines, levels, elevations and measurements. The Contractor must verify the figures shown on the drawings before laying out the work and shall be held responsible for any error resulting from failure to do so.
- B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.
- C. Should the Contractor discover any discrepancy between actual measurements and those indicated which prevents following good practice or the intent of the contract documents, the Contractor shall promptly notify the Engineer and shall not proceed with this work until the Contractor has received instructions from the Engineer on the disposition of the work.
- 1.17 PROTECTION OF MATERIALS AND EQUIPMENT
- A. The Contractor shall be entirely responsible for all material and equipment furnished in connection with the work and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer.
- B. All piping, etc., shall be properly plugged or capped during construction in a manner approved by the Engineer.
- C. Equipment damaged stolen or vandalized while stored on site, either before or after installation, shall be repaired or replaced at the Contractor’s expense.

- 1.18 EQUIPMENT SUPPORT
- A. Each piece of equipment, apparatus, piping, or conduit suspended from the ceiling or mounted above the floor level shall be provided with suitable structural support, pipe stand, platform or carrier in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and piping. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc.
- 1.19 DUCT AND PIPE MOUNTING HEIGHTS
- A. All exposed or concealed ductwork, piping, etc., shall be held as high as possible unless otherwise noted and coordinated with all other trades. Exposed piping and ductwork shall, insofar as possible, be routed perpendicular or parallel to the building structure.
- 1.20 ACCESSIBILITY AND ACCESS DOORS
- A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of the work.
- B. The Contractor shall cooperate with all others whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- C. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as coils, valves, filters, fan belts, motors, prime shafts, etc.
- D. The Contractor shall include in the bid any and all ceiling and wall access panels for each concealed shut-off valve, motorized control damper, manual air damper or other device requiring service as required whether indicated or not on the plans. Locations of these panels shall be identified by the Contractor in sufficient time to be installed in the normal course of work.
- E. Extra charges for ceiling and wall access panels will not be accepted!
- 1.21 FINAL CONNECTIONS TO EQUIPMENT
- A. The Contractor shall finally connect to mechanical services (water, waste, gas, and air), any terminal equipment, appliances, etc., provided under this and other divisions of the work. Such connections shall be made in strict accord with current codes, safety regulations and the equipment manufacturer's recommendations.
- 1.22 REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT
- A. The NEC has specific required clearances above, in front, and around electrical gear, panels etc.
- B. The Contractor shall not install any piping, ductwork, etc., in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated without additional cost to the Owner.
- 1.23 NOISE, VIBRATION OR OSCILLATION
- A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner at the Contractor's expense.
- B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports whether indicated or not suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc. by means of flexible connectors, vibration absorbers, or other approved means.
1. Unitary equipment, such as small room heating units, small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor or ceiling as required and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation. Flush and surface mounted equipment such as diffusers, grilles, etc., shall be gasketed and affixed tightly to their mounting surface.
- C. The Contractor shall provide supports for all equipment they furnish. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. If strength of supporting structural members is questionable, contact the Project Structural Engineer.
- 1.24 EQUIPMENT/CONTROLS STARTUP & VERIFICATION
- A. A pre-start-up conference shall be held with the Architect, Owner, General Contractor, Mechanical Contractor, Electrical Contractor, Controls Contractor, Test and Balance Contractor, and any manufacturer's providing startup services. The purpose of this meeting will be discuss the goals, procedures, etc. for start-up
- B. Equipment and controls startup and verification shall be required for this project.
1. A specific line-item shall be included on the schedule of values by each Trade for "equipment and controls startup".
2. This line-item value shall be approved by the Engineer. Draws against this line-item shall not occur until verification has been performed by the Engineer.
3. The Engineer, Owner and the Engineer's Field Inspectors shall closely monitor progress and quality of the equipment and controls startup and may withhold pay requests as deemed appropriate.
4. Final payment shall be contingent upon receipt of completed and approved checklists.

- C. The Contractor shall include in the bid to provide equipment and controls startup and verification for all mechanical systems specified for this project.
 - 1. Specific startup/verification specifications are included throughout the Mechanical specifications.
 - 2. In general, as part of the verification process, equipment suppliers shall perform “manufacturer” start-up by their factory authorized technicians (not third party contractors) and shall complete and submit start-up reports/checklists. Submit factory start-up reports to the Engineer. This shall include:
 - a. VRF Systems
 - 3. The contractor shall have appropriate trades on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action (including date and time) shall be submitted to the Engineer and Owner.
 - 4. Where factory start-up is not specified for a particular piece of equipment or system, the Contractor shall be responsible to perform start-up per the manufacturer’s recommended procedures.
 - D. Many pieces of equipment and systems are specified with “manufacturer” startup.
 - 1. In general, the manufacturer’s recommended startup procedures and checklists will be acceptable for use in the project.
 - 2. Where “manufacturer” startup is not specified, then this Contractor shall perform startup services in strict accordance with manufacturer’s recommended procedures.
 - 3. All startup/verification process shall be thoroughly documented by the Contractor and shall include the time and date when performed.
 - E. The Contractor shall be responsible for preparation and completion of System Verification Checklist (SVC) / Manufacturer’s Checklists.
 - 1. Furnish to the Testing Agent and Engineer.
 - 2. Sample checklists shall be submitted to the Engineer, Owner, and Testing Agent for approval.
- 1.25 FUNCTIONAL PERFORMANCE TESTING (FPT)
- A. A pre-start-up conference shall be held with the Architect, Owner, General Contractor, Mechanical Contractor, Electrical Contractor, Controls Contractor, Test and Balance Contractor, FPT Contractor and any manufacturer’s providing startup services. The purpose of this meeting will be discuss the goals, procedures, etc. for start-up
 - B. Startup and checkout of the mechanical systems is the responsibility of the Mechanical Contractor, not the FPT Contractor.
 - 1. The FPT Contractor’s responsibility is to direct, witness and document FPTs.
 - 2. The FPT is not a “debugging” process for the Mechanical Contractor.
 - 3. “Debugging” shall occur prior to the FPT by the Mechanical Contractor with appropriate documentation of completion submitted to the Engineer and FPT Contractor.
 - C. Equipment and controls startup and verification shall be required for this project.
 - 1. A specific line-item shall be included on the schedule of values by each Trade for “equipment and controls startup”.
 - 2. This line-item value shall be approved by the Engineer. Draws against this line-item shall not occur until verification has been performed by the Engineer.
 - 3. The Engineer, Owner and the Engineer’s Field Inspectors shall closely monitor progress and quality of the equipment and controls startup and may withhold pay requests as deemed appropriate.
 - 4. Final payment shall be contingent upon receipt of completed and approved checklists.
 - D. The Contractor shall include in the bid to provide equipment and controls startup and verification for all mechanical systems specified for this project.
 - 1. Specific startup/verification specifications are included throughout the Mechanical specifications.
 - 2. In general, as part of the verification process, equipment suppliers shall perform “manufacturer” start-up by their factory authorized technicians (not third party contractors) and shall complete and submit start-up reports/checklists. Submit factory start-up reports to the Engineer
 - 3. This shall include:
 - a. VRF Systems
 - b. Automatic Temperature Controls
 - 4. The contractor shall have appropriate trades on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action (including date and time) shall be submitted to the Engineer and Owner.
 - 5. Where factory start-up is not specified for a particular piece of equipment or system, the Contractor shall be responsible to perform start-up per the manufacturer’s recommended procedures.
 - E. Many pieces of equipment and systems are specified with “manufacturer” startup.
 - 1. In general, the manufacturer’s recommended startup procedures and checklists will be acceptable for use in the project.
 - 2. Where “manufacturer” startup is not specified, then this Contractor shall perform startup services in strict accordance with manufacturer’s recommended procedures.

3. All startup/verification process shall be thoroughly documented by the Contractor and shall include the time and date when performed.

PART 2 - EXECUTION (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 00 00

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.02 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 1. Motor controllers.
 2. Torque, speed, and horsepower requirements of the load.
 3. Ratings and characteristics of supply circuit and required control sequence.
 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.

2.02 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.03 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 1. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class H.
- J. Code Letter Designation:
 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T .

2.04 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 2. Premium-Efficient Motors: Class B temperature rise; Class H insulation.
 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.05 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 05 13

SECTION 23 05 17 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Sleeve-seal systems.
 - 3. Grout.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.02 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.01 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 - 2. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.02 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6 : Cast-iron wall sleeves.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6 : Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6 : Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6 : Galvanized-steel-pipe sleeves.

b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves.

END OF SECTION 23 05 17

SECTION 23 05 23 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.
 - 2. Iron, single-flange butterfly valves.
 - 3. Iron, grooved-end butterfly valves.
 - 4. Bronze swing check valves.
 - 5. Iron swing check valves.
 - 6. Iron gate valves.
 - 7. Bronze globe valves.
- B. Related Sections:
 - 1. Division 23 HVAC piping Sections for specialty valves applicable to those Sections only.
 - 2. Division 23 Section "Identification for HVAC Piping and Equipment" for valve tags and schedules.

1.02 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.03 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set angle, gate, and globe valves closed to prevent rattling.
 - 4. Set ball and plug valves open to minimize exposure of functional surfaces.
 - 5. Set butterfly valves closed or slightly open.
 - 6. Block check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to HVAC valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves located at suction and discharge piping off base mounted pumps, inlet and outlet of chillers or where specifically indicated on drawings.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves and where gear actuator are indicated above.
 - 4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.

- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Gate Valves: With rising stem.
 - 2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - 3. Butterfly Valves: With extended neck.
 - F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Grooved: With grooves according to AWWA C606.
- 2.02 BRONZE BALL VALVES
- A. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE or TFE.
 - h. Stem: Stainless steel.
 - i. Ball: Stainless steel, vented.
 - j. Port: Full.
- 2.03 IRON, SINGLE-FLANGE BUTTERFLY VALVES
- A. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABZ Valve and Controls; a division of ABZ Manufacturing, Inc.
 - b. Bray Controls; a division of Bray International.
 - c. Conbraco Industries, Inc.; Apollo Valves.
 - d. Cooper Cameron Valves; a division of Cooper Cameron Corp.
 - e. Crane Co.; Crane Valve Group; Jenkins Valves.
 - f. Crane Co.; Crane Valve Group; Stockham Division.
 - g. DeZurik Water Controls.
 - h. Hammond Valve.
 - i. Kitz Corporation.
 - j. Milwaukee Valve Company.
 - k. NIBCO INC.
 - l. Norriseal; a Dover Corporation company.
 - m. Red-White Valve Corporation.
 - n. Spence Strainers International; a division of CIRCOR International.
 - o. Tyco Valves & Controls; a unit of Tyco Flow Control.
 - p. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-67, Type I.
 - b. CWP Rating: 150 psig.
 - c. Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - e. Seat: EPDM.
 - f. Stem: One- or two-piece stainless steel.
 - g. Disc: Aluminum bronze.
- 2.04 BRONZE SWING CHECK VALVES
- A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze.

2.05 BRONZE GATE VALVES

A. Class 125, RS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 2.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem: Bronze.
 - f. Disc: Solid wedge; bronze.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron.

2.06 BRONZE GLOBE VALVES

A. Class 125 and Class 150, Bronze Globe Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hammond Valve.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
2. Description:
 - a. Standard: MSS SP-80, Type 1.
 - b. CWP Rating: 200 psig.
 - c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - d. Ends: Threaded or solder joint.
 - e. Stem and Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.02 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.

3.03 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.04 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated or valve type indicated on drawings, use the following:
 - 1. Shutoff Service: Ball, butterfly, or gate valves.
 - 2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
 - 3. Throttling Service (at locations that do not require calibrated balancing valve): Globe.
 - 4. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - b. NPS 2-1/2 and Larger: Triple duty type calibrated balancing valve.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
- C. Select valves, except wafer types, with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Solder-joint except where indicated otherwise.
 - 2. For Steel Piping, NPS 2-1/2 and Larger: Flanged ends.
 - 3. For Grooved-End Steel Piping: Valve ends may be grooved.

3.05 CHILLED, GEOTHERMAL & HOT-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller:
 - 1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.
 - 2. Ball Valves: Two piece, full port, bronze with stainless-steel trim.
 - 3. Bronze Swing Check Valves: Class 125, bronze disc.
 - 4. Bronze Gate Valves: Class 125, NRS, bronze.
 - 5. Bronze Globe Valves: Class 125, bronze disc.
- B. Pipe NPS 2-1/2 and Larger:
 - 1. Iron, Single-Flange Butterfly Valves, NPS 2-1/2 to NPS 12: 200 CWP, EPDM seat, aluminum-bronze disc.
 - 2. Iron, Grooved-End Butterfly Valves, NPS 2-1/2 to NPS 12: 175 CWP.
 - 3. Iron Gate Valves: Class 125, NRS.

END OF SECTION 23 05 23

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Fastener systems.
 - 5. Pipe stands.
 - 6. Equipment supports.

1.02 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Trapeze pipe hanger and equipment support design is the responsibility of the Contractor, using performance requirements and design criteria indicated.

1.04 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.01 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.
- B. Stainless-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- C. Copper Pipe Hangers:
 - 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.02 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.
- B. The Contractor shall obtain permission from the Engineer to utilize trapeze pipe hangers and also perform all necessary calculations and detailing at each location used.

2.03 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig or ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.04 FASTENER SYSTEMS

- A. The Contractor shall obtain permission from the Engineer prior to use of fastener systems.
- B. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- C. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.05 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Unless otherwise specifically indicated or hereinafter specified in the specifications, all supporting, hanging and anchoring of piping, ductwork, equipment, etc., shall be performed by each trade as is necessary for completion of the work per the specifications.
- B. Supporting and hanging shall be done so that excessive load will not be placed on any one hanger so as to allow for proper pitch and expansion of piping. Hangers and supports shall be placed as near as possible to joints, turns and branches.
- C. For concrete construction, utilize adjustable concrete inserts for fasteners. Expansion anchors and power driven devices may be used when approved in writing by the Engineer.
- D. Utilize beam clamps for fastening to steel joists and beams and expansion anchors in masonry construction.
- E. When piping is routed within joists, piping shall be top mounted on trapeze type hangers with each pipe individually clamped to trapeze hanger.
- F. Trapeze hangers are not allowed, unless specifically approved by the engineer.
- G. Install all miscellaneous steel other than designed building structural members as required to provide means of securing hangers, supports, etc., where piping does not pass directly below or cross steel joists.
- H. Piping shall not be supported by the equipment to which it is connected. Support all piping so as to remove any load or stress from the equipment.
- I. Where piping, etc., is routed vertically, approved riser clamps, brackets or other means shall be utilized at approximately 10'-0" center to center minimum and an approved adjustable base stand or fitting on concrete support base shall be utilized at the base of the vertical run.
- J. Where piping is routed along walls, knee braced angle frames or pipe brackets with saddles, clamps, and rollers (where required) mounted on structural brackets fastened to walls or columns shall be used.
- K. Support all ceiling hung equipment, with approved vibration isolators.
- L. Where copper tubing is specified, hangers shall be of copper clad type when piping is uninsulated.
- M. Uninsulated piping hung from above shall be supported with ring and clevis type pipe hangers. Uninsulated piping mounted on trapeze and wall bracket type support shall be held in place with U-bolts. U-bolts shall allow for axial movement in the piping.
- N. All insulated piping shall be supported with clevis type and pipe roll hangers. Hangers shall be sized to allow the pipe insulation to pass through the hangers. Install insulation protection saddles at all hanger locations. Welded pipe saddles shall be installed at all hangers on piping 5" and larger. The pipe saddles shall be sized for the thickness of insulation used. Hangers shall fit snugly around outside of insulation saddles.
- O. Under no conditions will perforated band iron or steel wire driven hangers be permitted.
- P. In general, support piping at the following spacing:
 - 1. Steel and copper piping - 8 foot intervals for piping 3" and smaller; 10 foot intervals for larger piping.
- Q. Where fireproofing is damaged from the building structures due to contractor's installation of hangers, clamps, etc., it shall be the contractor's responsibility to repair all dislodged/damaged fireproofing to original fire proof rating. This shall also include all work performed by the contractor's sub-contractors.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. The Contractor shall obtain permission from the Engineer to utilize trapeze pipe hangers and also perform all necessary calculations and detailing at each location used.
 - 2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 3. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- D. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- E. Pipe Stand Installation:
1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 07 Section "Roof Accessories" for curbs.
 3. The Contractor shall perform all necessary calculations and detailing at each location used.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- I. Install lateral bracing with pipe hangers and supports to prevent swaying.
- J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- M. Insulated Piping:
1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4 and NPS 6: 18 inches long and 0.06 inch thick.
 - c. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - d. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.

4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1 inch.

3.05 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.06 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use stainless-steel pipe hangers and stainless-steel or corrosion-resistant attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.
- J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
- K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
- L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
- M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
- O. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- P. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- Q. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction after permission is obtained from the Engineer.

END OF SECTION 23 05 29

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Duct labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.02 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 EQUIPMENT LABELS

- A. Plastic Labels for Equipment:
 - 1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 - 2. Letter Color: White.
 - 3. Background Color: Black.
 - 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 - 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 - 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 7. Fasteners: Stainless-steel self-tapping screws.
 - 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Label Content: Include equipment's Drawing designation or unique equipment number.

2.02 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.03 DUCT LABELS

- A. Duct Stencil Requirements:
 - 1. Letter Color: Black.
 - 2. Minimum Letter Size: Refer to "Stencils" paragraph within this section.
 - 3. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 4. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 5. Lettering Size: At least 1-1/2 inches high.

2.04 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/2 inches for ducts
 - 1. Stencil Material: Fiberboard or metal.
 - 2. Stencil Paint: GS-11 compliant, low emitting, black paint .

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.
- B. Mark each lay-in ceiling panel which is nearest access to equipment, valves, dampers, filters, duct heaters, etc., with a lamacoid plate located on the ceiling grid.

3.02 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.03 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping shall be according to the following chart:
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels on each piping system.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 15 feet along each run.
 - 7. On piping above removable acoustical ceilings. All piping shall be minimally identified once above all room ceilings and where it passes thru walls or floors.
- D. Pipe Label Schedule:
 - 1. Chilled Water Piping: CWS/CWR.
 - 2. Heating Water Piping: HWS/HWR

3.04 DUCT LABEL INSTALLATION

- A. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 15 feet in each space where ducts are exposed or concealed by removable ceiling system.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.01 OVERVIEW

- A. This section is for reference only. TAB services will be provided by the owner.

1.02 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. All forced air systems.

1.03 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.
- F. TCC: Temperature Control Contractor.

1.04 SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Strategies and Procedures Plan: Within 90 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- C. Certified TAB reports.
- D. Sample report forms.
- E. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.05 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB .
 - 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB as a TAB technician.
- B. TAB Conference: Meet with Architect on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide fourteen days' advance notice of scheduled meeting time and location.
 - 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect .
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.06 PROJECT CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.07 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TAB SPECIALISTS

3.02 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- M. Examine system pumps to ensure absence of entrained air in the suction piping.
- N. Examine operating safety interlocks and controls on HVAC equipment.
- O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.03 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Refrigerant systems are complete.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Windows and doors can be closed so indicated conditions for system operations can be met.

3.04 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.05 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
 - F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 - G. Verify that motor starters are equipped with properly sized thermal protection.
 - H. Check dampers for proper position to achieve desired airflow path.
 - I. Check for airflow blockages.
 - J. Check condensate drains for proper connections and functioning.
 - K. Check for proper sealing of air-handling-unit components.
 - L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."
- 3.06 PROCEDURES FOR MOTORS
- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
 - B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.
- 3.07 PROCEDURES FOR CONDENSING UNITS
- A. Verify proper rotation of fans.
 - B. Measure entering- and leaving-air temperatures.
 - C. Record compressor data.
- 3.08 PROCEDURES FOR HEAT-TRANSFER COILS
- A. Measure, adjust, and record the following data for each water coil:
 - 1. Entering- and leaving-water temperature.
 - 2. Water flow rate.
 - 3. Water pressure drop.
 - 4. Dry-bulb temperature of entering and leaving air.
 - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 - 6. Airflow.
 - 7. Air pressure drop.
- 3.09 TOLERANCES
- A. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent .
 - 2. Air Outlets and Inlets: Plus or minus 10 percent .
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent .
 - 4. Cooling-Water Flow Rate: Plus or minus 10 percent .
- 3.10 REPORTING
- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- 3.11 FINAL REPORT
- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
 - B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Manufacturers' test data.
 - 2. Field test reports prepared by system and equipment installers.
 - 3. Other information relative to equipment performance; do not include Shop Drawings and product data.
 - C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB contractor.

3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and refrigerant distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Pipe and valve sizes and locations.
 4. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Discharge static pressure in inches wg.
 - d. Filter static-pressure differential in inches wg.
 - e. Outdoor airflow in cfm.
 - f. Return airflow in cfm.

- g. Return-air damper position.
- F. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- G. Instrument Calibration Reports:
 - 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.12 INSPECTIONS

- A. Initial Inspection:
 - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - 2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 50 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.
- B. Final Inspection:
 - 1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect .
 - 2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Architect .
 - 3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 - 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 - 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - 1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.

2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Phenolic.
 - c. Mineral fiber.
 - 2. Adhesives.
 - 3. Mastics.
 - 4. Lagging adhesives.
 - 5. Sealants.
 - 6. Field-applied cloths.
 - 7. Tapes.
 - 8. Securements.
 - 9. Corner angles.
- B. Related Sections:
 - 1. Division 21 Section "Fire-Suppression Systems Insulation."
 - 2. Division 22 Section "Plumbing Insulation."
 - 3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.5 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following :
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied FSK jacket. For equipment applications, provide insulation with factory-applied ASJ . Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following :
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- I. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000 Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
 - 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ or with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- J. Phenolic:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Kingspan Corp.; Koolphen K.
 - 2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
 - 3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
 - 4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
 - 5. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - a. Preformed Pipe Insulation: ASJ.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
- C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - 1. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - 4. Color: White.

2.4 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
2. Service Temperature Range: Minus 50 to plus 180 deg F.
3. Color: White.

2.5 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Permanently flexible, elastomeric sealant.
 - c. Service Temperature Range: Minus 100 to plus 300 deg F.
 - d. Color: White or gray.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: Aluminum.
5. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: Minus 40 to plus 250 deg F.
4. Color: White.

2.6 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.7 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 11.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Width: 3 inches.
2. Thickness: 6.5 mils.
3. Adhesion: 90 ounces force/inch in width.
4. Elongation: 2 percent.
5. Tensile Strength: 40 lbf/inch in width.
6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Width: 2 inches.
2. Thickness: 3.7 mils.
3. Adhesion: 100 ounces force/inch in width.
4. Elongation: 5 percent.
5. Tensile Strength: 34 lbf/inch in width.

2.8 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
 - 2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal .
 - 3. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
 - B. Insulation Pins and Hangers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.
- 2.9 CORNER ANGLES
- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
 - B. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
1. Comply with requirements in Division 07 Section "Penetration Firestopping" firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
1. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 2. Pipe: Install insulation continuously through floor penetrations.
 3. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 - 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.6 PHENOLIC INSULATION INSTALLATION

- A. General Installation Requirements:
 - 1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
 - 2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
- B. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets with vapor retarders on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- C. Insulation Installation on Pipe Flanges:
 - 1. Install preformed pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
- D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
- E. Insulation Installation on Valves and Pipe Specialties:
 1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 3. Install insulation to flanges as specified for flange insulation application.
- 3.7 DUCT INSULATION SCHEDULE, GENERAL
 - A. Plenums and Ducts Requiring Insulation:
 1. All Supply Air (SA) and Outdoor Air (OA) ducts shall be insulated.
 - B. Items Not Insulated:
 1. Fibrous-glass ducts.
 2. Return air ducts.
 3. Factory-insulated flexible ducts.
 4. Factory-insulated plenums and casings.
 5. Flexible connectors.
 6. Vibration-control devices.
 7. Factory-insulated access panels and doors.
- 3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE
 - A. Concealed, round and flat-oval, supply-air duct insulation shall be the following:
 1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 - B. Concealed, rectangular, supply-air duct insulation shall be the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
 - C. Concealed, rectangular, outdoor-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.
 - D. Exposed rectangular and round or flat-oval, supply-air duct insulation shall be the following:
 1. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- 3.9 PIPING INSULATION SCHEDULE, GENERAL
 - A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 - B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- 3.10 INDOOR PIPING INSULATION SCHEDULE
 - A. Condensate and Equipment Drain Water below 60 Deg F:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 3/4 inch thick.
 - B. Chilled Water:
 1. NPS 12 and Smaller: Insulation shall be the following:
 - a. Phenolic, Preformed Pipe, Type III: 2 inches thick.
 - C. Heating-Hot-Water Supply and Return, 200 Deg F and below:
 1. NPS 4 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.
- 3.11 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE
 - A. Refrigerant Piping:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. EPDM Elastomeric: 2 inches thick with aluminum jacketing.

END OF SECTION 23 07 00

SECTION 23 08 00 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.
- B. Related Sections:
 - 1. Section 01 91 13 "General Commissioning Requirements" for general commissioning process requirements.

1.02 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. CxA: Commissioning Authority.
- C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.03 INFORMATIONAL SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

1.04 ALLOWANCES

- A. Labor, instrumentation, tools, and equipment costs for technicians for the performance of commissioning testing are covered by the "Schedule of Allowances" Article in Section 01 21 00 "Allowances."

1.05 UNIT PRICES

- A. Commissioning testing allowance may be adjusted up or down by the "List of Unit Prices" Article in Section 01 22 00 "Unit Prices" when actual man-hours are computed at the end of commissioning testing.

1.06 CONTRACTOR'S RESPONSIBILITIES

- A. Perform commissioning tests at the direction of the CxA.
- B. Attend construction phase controls coordination meeting.
- C. Attend testing, adjusting, and balancing review and coordination meeting.
- D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
- E. Provide information requested by the CxA for final commissioning documentation.
- F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.07 CxA'S RESPONSIBILITIES

- A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Direct commissioning testing.
- C. Verify testing, adjusting, and balancing of Work are complete.
- D. Provide test data, inspection reports, and certificates in Systems Manual.

1.08 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
 - 5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
 - 6. Test and inspection reports and certificates.
 - 7. Corrective action documents.
 - 8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TESTING PREPARATION

- A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

- B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.
- C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.
- D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).
- E. Inspect and verify the position of each device and interlock identified on checklists.
- F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.02 GENERAL TESTING REQUIREMENTS

- A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.
- B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.
- C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.
- D. The CxA along with the HVAC&R Subcontractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Subcontractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.
- E. Tests will be performed using design conditions whenever possible.
- F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.
- G. The CxA may direct that set points be altered when simulating conditions is not practical.
- H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.
- I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.
- J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.03 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

- A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in HVAC boiler Sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.
- B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Section 23 09 00 "Direct Digital Control (DDC) System for HVAC" and Section 23 09 93 "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.
- C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in HVAC piping Sections. HVAC&R Subcontractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:
 1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
 2. Description of equipment for flushing operations.
 3. Minimum flushing water velocity.
 4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.
- D. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.
- E. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

END OF SECTION 23 08 00

SECTION 23 09 20 - VARIABLE FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes separately enclosed, pre-assembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.02 DEFINITIONS

- A. BAS: Building automation system.
- B. CPT: Control power transformer.
- C. EMI: Electromagnetic interference.
- D. IGBT: Insulated-gate bipolar transistor.
- E. LAN: Local area network.
- F. LED: Light-emitting diode.
- G. MCP: Motor-circuit protector.
- H. NC: Normally closed.
- I. NO: Normally open.
- J. OCPD: Overcurrent protective device.
- K. PCC: Point of common coupling.
- L. PID: Control action, proportional plus integral plus derivative.
- M. PWM: Pulse-width modulated.
- N. RFI: Radio-frequency interference.
- O. TDD: Total demand (harmonic current) distortion.
- P. THD(V): Total harmonic voltage demand.
- Q. VFC or VFD: Variable-frequency motor controller.

1.03 SUBMITTALS

- A. Product Data: For each type and rating of VFC indicated. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, and furnished specialties and accessories.
- B. Shop Drawings: For each VFC indicated. Include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - 1. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Each installed unit's type and details.
 - b. Factory-installed devices.
 - c. Enclosure types and details.
 - d. Nameplate legends.
 - e. Short-circuit current (withstand) rating of enclosed unit.
 - f. Features, characteristics, ratings, and factory settings of each VFC and installed devices.
 - 2. Schematic and Connection Wiring Diagrams: For power, signal, and control wiring.
- C. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip settings.
 - 2. Manufacturer's written instructions for setting field-adjustable overload relays.
 - 3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - 4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
- D. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
- E. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.04 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. IEEE Compliance: Fabricate and test VFC according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 14 deg F and not exceeding 104 deg F.

2. Ambient Storage Temperature: Not less than minus 4 deg F and not exceeding 140 deg F
3. Humidity: Less than 95 percent (noncondensing).
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.06 COORDINATION

- A. Coordinate features of motors, load characteristics, installed units, and accessory devices to be compatible with the following:
 1. Torque, speed, and horsepower requirements of the load.
 2. Ratings and characteristics of supply circuit and required control sequence.
 3. Ambient and environmental conditions of installation location.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following acceptable manufacturers:
 1. ABB.
- B. General Requirements for VFCs:
 1. All VFC on project shall be supplied from the same manufacturer. This shall included but not be limited to air handling equipment and pumps, etc.
 2. All VFCs shall have disconnect and manual bypass:
 3. Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.
- C. Application: Variable torque.
- D. VFC Description: Variable-frequency power converter (rectifier, dc bus, and IGBT, PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 1. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
 2. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- E. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- F. Output Rating: Three-phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range; maximum voltage equals input voltage.
- G. Unit Operating Requirements:
 1. Input AC Voltage Tolerance: Plus 10 and minus 10 percent of VFC input voltage rating.
 2. Input AC Voltage Unbalance: Not exceeding 3 percent.
 3. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 4. Minimum Efficiency: 97 percent at 60 Hz, full load.
 5. Minimum Displacement Primary-Side Power Factor: 98 percent under any load or speed condition.
 6. Ambient Temperature Rating: Not less than 14 deg F and not exceeding 104 deg F.
 7. Ambient Storage Temperature Rating: Not less than minus 4 deg F and not exceeding 140 deg F
 8. Humidity Rating: Less than 95 percent (noncondensing).
 9. Altitude Rating: Not exceeding 3300 feet.
 10. Vibration Withstand: Comply with IEC 60068-2-6.
 11. Overload Capability: 1.1 times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 12. Starting Torque: Minimum 100 percent of rated torque from 3 to 60 Hz.
 13. Speed Regulation: Plus or minus 5 percent.
 14. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.
 15. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- H. Inverter Logic: Microprocessor based, 32 bit, isolated from all power circuits.

- I. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
 - 1. Signal: Electrical.
 - J. Internal Adjustability Capabilities:
 - 1. Minimum Speed: 5 to 25 percent of maximum rpm.
 - 2. Maximum Speed: 80 to 100 percent of maximum rpm.
 - 3. Acceleration: 0.1 to 999.9 seconds.
 - 4. Deceleration: 0.1 to 999.9 seconds.
 - 5. Current Limit: 30 to minimum of 150 percent of maximum rating.
 - K. Self-Protection and Reliability Features:
 - 1. Input transient protection by means of surge suppressors to provide three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - 2. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - 3. Under- and overvoltage trips.
 - 4. Inverter overcurrent trips.
 - 5. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved.
 - 6. Critical frequency rejection, with three selectable, adjustable deadbands.
 - 7. Instantaneous line-to-line and line-to-ground overcurrent trips.
 - 8. Loss-of-phase protection.
 - 9. Reverse-phase protection.
 - 10. Short-circuit protection.
 - 11. Motor overtemperature fault.
 - L. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
 - M. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
 - N. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
 - O. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
 - P. Integral Input Disconnecting Means and OCPD: NEMA AB 1, molded-case switch, with power fuse block and current-limiting fuses with pad-lockable, door-mounted handle mechanism.
 - 1. Disconnect Rating: Not less than 115 percent of VFC input current rating.
 - 2. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
 - 3. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
- 2.02 CONTROLS AND INDICATION
- A. Status Lights: Door-mounted LED indicators displaying the following conditions:
 - 1. Power on.
 - 2. Run.
 - 3. Overvoltage.
 - 4. Line fault.
 - 5. Overcurrent.
 - 6. External fault.
 - B. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - 1. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 - 2. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - a. Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
 - C. Historical Logging Information and Displays:
 - 1. Real-time clock with current time and date.
 - 2. Running log of total power versus time.
 - 3. Total run time.
 - 4. Fault log, maintaining last four faults with time and date stamp for each.

- D. Indicating Devices: Digital display mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
 - 1. Output frequency (Hz).
 - 2. Motor speed (rpm).
 - 3. Motor status (running, stop, fault).
 - 4. Motor current (amperes).
 - 5. Motor torque (percent).
 - 6. Fault or alarming status (code).
 - 7. PID feedback signal (percent).
 - 8. DC-link voltage (V dc).
 - 9. Set point frequency (Hz).
 - 10. Motor output voltage (V ac).
- E. Control Signal Interfaces:
 - 1. Electric Input Signal Interface:
 - a. A minimum of two programmable analog inputs: 0- to 10-V dc 4- to 20-mA dc.
 - b. A minimum of six multifunction programmable digital inputs.
 - 2. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BAS or other control systems:
 - a. 0- to 10-V dc.
 - b. 4- to 20-mA dc.
 - c. Potentiometer using up/down digital inputs.
 - d. Fixed frequencies using digital inputs.
 - 3. Output Signal Interface: A minimum of two programmable analog output signal(s) (0- to 10-V dc 4- to 20-mA dc), which can be configured for any of the following:
 - a. Output frequency (Hz).
 - b. Output current (load).
 - c. DC-link voltage (V dc).
 - d. Motor torque (percent).
 - e. Motor speed (rpm).
 - f. Set point frequency (Hz).
 - 4. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a. Motor running.
 - b. Set point speed reached.
 - c. Fault and warning indication (overtemperature or overcurrent).
 - d. PID high- or low-speed limits reached.
- F. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
 - 1. Number of Loops: One .
- G. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display VFC status and alarms and energy usage. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.
 - 1. Network Communications Ports: Ethernet and RS-422/485.
 - 2. Embedded BAS Protocols for Network Communications: ASHRAE 135 BACnet; protocols accessible via the communications ports.

2.03 BYPASS SYSTEMS, (Refer to drawing schedule for locations required)

- A. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.
- B. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.
- C. Bypass Controller: Two-contactor-style bypass allows motor operation via the power converter or the bypass controller.
 - 1. Bypass Contactor: Load-break, IEC-rated contactor.
- D. Bypass Contactor Configuration: Full-voltage (across-the-line) type.
 - 1. NORMAL/BYPASS selector switch.
 - 2. Contactor Coils: Pressure-encapsulated type.
 - a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

- b. Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
- 3. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
 - a. CPT Spare Capacity: 50 VA.
- 4. Overload Relays: NEMA ICS 2.
 - a. Melting-Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - b. External overload reset push button.

2.04 ENCLOSURES

- A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.

2.05 ACCESSORIES

- A. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
 - 1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, type.
 - a. Push Buttons: Unguarded types; maintained.
 - b. Pilot Lights: LED types;
 - c. Selector Switches: Rotary type.
- B. Control Relays: Auxiliary and adjustable solid-state time-delay relays.
- C. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
 - 1. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Coordinate layout and installation of VFCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Wall-Mounting Controllers: Install VFCs on walls with tops at uniform height and with disconnect operating handles not higher than 79 inches above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."
- C. Install fuses in each fusible-switch VFC.
- D. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses."
- E. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- F. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFC with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.
- B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.04 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices and facility's central-control system. Comply with requirements in Division 26 Section "Control-Voltage Electrical Power Cables."

- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic control devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic control devices that have no safety functions when switches are in manual-control position.
 - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.
- 3.05 STARTUP SERVICE
 - A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Insert startup steps if any.
- 3.06 ADJUSTING
 - A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
 - B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
 - C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Architect before increasing settings.
 - D. Set the taps on reduced-voltage autotransformer controllers.
 - E. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study."
 - F. Set field-adjustable pressure switches.
- 3.07 PROTECTION
 - A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
 - B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.
- 3.08 DEMONSTRATION
 - A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION 23 09 20

SECTION 23 23 00 - REFRIGERANT PIPING

PART 1 - GENERAL

- 1.1 SUMMARY
 - A. This Section includes refrigerant piping used for air-conditioning applications.
- 1.2 PERFORMANCE REQUIREMENTS
 - A. Line Test Pressure for Refrigerant R-410A:
 - 1. Suction Lines for Air-Conditioning Applications: 300 psig.
 - 2. Suction Lines for Heat-Pump Applications: 535 psig.
 - 3. Hot-Gas and Liquid Lines: 535 psig.
- 1.3 QUALITY ASSURANCE
 - A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
 - B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."
- 1.4 PRODUCT STORAGE AND HANDLING
 - A. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

- 2.1 COPPER TUBE AND FITTINGS
 - A. Copper Tube: ASTM B 280, Type ACR.
 - B. Wrought-Copper Fittings: ASME B16.22.
 - C. Wrought-Copper Unions: ASME B16.22.
 - D. Brazing Filler Metals: AWS A5.8.
 - E. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.
 - 4. Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.
- 2.2 REFRIGERANTS
 - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Atofina Chemicals, Inc.
 - 2. DuPont Company; Fluorochemicals Div.
 - 3. Honeywell, Inc.; Genetron Refrigerants.
 - 4. INEOS Fluor Americas LLC.
 - B. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

- 3.1 PIPING APPLICATIONS FOR ALL REFRIGERANT
 - A. Piping NPS 4 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with brazed joints.
 - B. Safety-Relief-Valve Discharge Piping: Copper, Type ACR, drawn-temper tubing and wrought-copper fittings with soldered joints.
- 3.2 PIPING INSTALLATION
 - A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
 - B. Install refrigerant piping according to ASHRAE 15.
 - C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
 - D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - F. Install piping adjacent to machines to allow service and maintenance.
 - G. Install piping free of sags and bends.
 - H. Install fittings for changes in direction and branch connections.
 - I. Select system components with pressure rating equal to or greater than system operating pressure.
 - J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors and Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
 - L. Install refrigerant piping in protective conduit where installed belowground.
 - M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
 - N. Slope refrigerant piping as follows:
 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 2. Install horizontal suction lines with a uniform slope downward to compressor.
 3. Install traps and double risers to entrain oil in vertical runs.
 4. Liquid lines may be installed level.
 - O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
 - P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- 3.3 PIPE JOINT CONSTRUCTION
- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - C. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
 - D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 1. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 2. Use Type BAg, cadmium-free silver alloy for joining copper with bronze or steel.
- 3.4 HANGERS AND SUPPORTS
- A. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
 - B. Install the following pipe attachments:
 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 2. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
 - C. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
- 3.5 FIELD QUALITY CONTROL
- A. Perform tests and inspections and prepare test reports.
 - B. Tests and Inspections:
 1. Comply with ASME B31.5, Chapter VI.
 2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - a. Fill system with nitrogen to the required test pressure.
 - b. System shall maintain test pressure at the manifold gage throughout duration of test.
 - c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.
- 3.6 SYSTEM CHARGING
- A. Charge system using the following procedures:
 1. Install core in filter dryers after leak test but before evacuation.
 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 4. Charge system with a new filter-dryer core in charging line.
- 3.7 ADJUSTING
- A. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION 23 23 00

SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Single-wall round and flat-oval ducts and fittings.
 - 3. Double-wall round and flat-oval ducts and fittings.
 - 4. Sheet metal materials.
 - 5. Sealants and gaskets.
 - 6. Hangers and supports.
- B. Related Sections:
 - 1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 - 2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Duct hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in current year SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Factory- and shop-fabricated ducts and fittings.
 - 2. Fittings.
 - 3. Penetrations through fire-rated and other partitions.
 - 4. Hangers and supports, including methods for duct and building attachment and vibration isolation.
 - 5. Provide specific gauge of sheet metal used for each pressure class and associated application and specific applicable current year SMACNA duct construction reinforcing table and details.
- B. Coordination Drawings: For duct systems with pressure class of 3" or greater or installed in exposed locations, provide scaled, field coordinated drawings of the complete duct system. Included with drawings:
 - 1. All duct systems, i.e. supply, return, exhaust, etc.
 - 2. All fitting types used.
- C. Coordination of Existing Conditions: Prior to purchase and fabrication of ductwork (shop fabricated or manufactured), coordinate installation with both new and existing conditions. Notify architect of any discrepancies.

1.04 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.01 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with current year SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated. Minimum gauge thickness for Rectangular duct is 24 gauge.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to current year SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Lindab Inc.
 - b. McGill AirFlow LLC.
 - c. SEMCO Incorporated.
 - d. Eastern Sheet Metal
- B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Transverse Joints - Round Duct," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Transverse Joints in Ducts Larger Than 24" in Diameter or 24" duct width: Flanged.
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Seams - Round Duct and Fittings," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - 1. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
 - 2. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.
- E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "90 Degree Tees and Laterals," and current year figures, charts or tables for, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.03 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60 .
 - 2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils thick on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 4 mil thick on opposite surface.
 - 3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.
- D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- F. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- G. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- H. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.04 DUCT LINER

- A. General: Duct liner is to be used only on RA ducts for sound control where specifically indicated on drawings. Refer to Duct Schedule in this section for additional information.
- B. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. CertainTeed Corporation; Insulation Group.
 - b. Johns Manville.
 - c. Knauf Insulation.
 - d. Owens Corning.
 - e. Maximum Thermal Conductivity:
 - 1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
 - 2. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - C. Insulation Pins and Washers:
 - 1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - D. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
 - 1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 - 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - 3. Butt transverse joints without gaps, and coat joint with adhesive.
 - 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 - 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
 - 6. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
 - 7. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.
- 2.05 SEALANT AND GASKETS
- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - B. Water-Based Joint and Seam Sealant:
 - 1. Application Method: Brush on.
 - 2. Solids Content: Minimum 65 percent.
 - 3. Shore A Hardness: Minimum 20.
 - 4. Water resistant.
 - 5. Mold and mildew resistant.
 - 6. VOC: Maximum 75 g/L (less water).
 - 7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - 8. Service: Indoor or outdoor.
 - 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
 - C. Flanged Joint Sealant: Comply with ASTM C 920.
 - 1. General: Single-component, acid-curing, silicone, elastomeric.
 - 2. Type: S.
 - 3. Grade: NS.
 - 4. Class: 25.
 - 5. Use: O.
 - 6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - D. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.
- 2.06 HANGERS AND SUPPORTS
- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
 - B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Rectangular Duct Hangers Minimum Size," and current year figures, charts or tables for, "Minimum Hanger Sizes for Round Duct."
 - 1. Duct constructed to Pressure Class of 3" or greater shall only use trapeze type hangers. Hangers screwed to ductwork are not allowed.
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
- E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
- F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.01 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round and flat-oval ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines."

3.02 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.04 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Rectangular Duct Hangers Minimum Size," and current year figures, charts or tables for, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- 3.05 CONNECTIONS
- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.
- 3.06 PAINTING
- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.
- 3.07 START UP
- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."
- 3.08 DUCT SCHEDULE
- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
- B. Supply Ducts and Outside Air Ducts:
1. Ducts Connected to Variable-Air-Volume Air-Handling Units, (ductwork from discharge of AHU's to inlet of terminal box):
 - a. Pressure Class: Positive 6-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Round and Flat Oval: 3.
 - d. Rectangular duct is not allowed.
 2. Ducts Connected to single zone and AHU's:
 - a. Pressure Class: Positive or negative 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. Minimum gauge thickness for Rectangular: 24 gauge.
 3. Ducts Connected to Fan-coils and Terminal Boxes:
 - a. Pressure Class: Positive 1-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.
 - e. Minimum gauge thickness for Rectangular: 24 gauge.
- C. Return and Exhaust Ducts:
1. Ducts Connected to AHU's and OAU's:
 - a. Pressure Class: Positive or negative 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. Minimum gauge thickness for Rectangular: 24 gauge.
 2. All Return and Exhaust Ducts connected Terminal boxes and Exhaust Fans:
 - a. Pressure Class: Positive or negative 1-inch wg .
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 12.
 - d. SMACNA Leakage Class for Round and Flat Oval: 12.
 - e. Minimum gauge thickness for Rectangular: 24 gauge.
 3. Ducts Connected to Commercial Dryers:
 - a. Pressure Class: Positive or negative 4-inch wg.

- b. Minimum SMACNA Seal Class: A.
- c. SMACNA Leakage Class for Rectangular: 3.
- d. SMACNA Leakage Class for Round and Flat Oval: 3.
- e. Minimum gauge thickness for Rectangular: 24 gauge.
- 4. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.
 - a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
 - b. Concealed: Carbon-steel sheet.
 - c. Welded seams and joints.
 - d. Pressure Class: Positive or negative 2-inch wg.
 - e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
 - f. SMACNA Leakage Class: 3.
- 5. Ducts Connected to Dishwasher Exhaust System:
 - a. Type 304, stainless-steel sheet.
 - b. Exposed to View: No. 4 finish.
 - c. Concealed: No. 2D finish.
 - d. Welded seams and flanged joints with watertight EPDM gaskets.
 - e. Pressure Class: Positive or negative 2-inch wg.
 - f. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
 - g. SMACNA Leakage Class: 3.
- D. Elbow Configuration:
 - 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Vanes and Vane Runners," and current year figures, charts or tables for, "Vane Support in Elbows."
 - 2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," current year figures, charts or tables for, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Radius-to Diameter Ratio: 1.5.
 - b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, 14 Inches and Larger in Diameter: Welded.
- E. Branch Configuration:
 - 1. Rectangular Duct: Refer to drawings for details. 45-degree entry's are required at all connections to rectangular mains. Spin-in duct fitting are not allowed in any locations.
 - 2. Round and Flat Oval: Connections shall be combination type tees, refer to drawings for additional details.
- F. Liner: Liner is used for noise control only, in general it is used on the last 10 ft of return ductwork. Only use on RA duct were specifically indicated on drawings.
 - 1. Return Air Ducts: Fibrous glass, Type I, 1 inch thick.

END OF SECTION 23 31 13

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Control dampers.
 - 3. Flange connectors.
 - 4. Duct silencers.
 - 5. Turning vanes.
 - 6. Duct-mounted access doors.
 - 7. Flexible connectors.
 - 8. Flexible ducts.
 - 9. Duct accessory hardware.
- B. Related Sections:
 - 1. Division 23 Section "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
 - 2. Division 28 Section "Fire Detection and Alarm" for duct-mounted fire and smoke detectors.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
- B. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.03 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
- C. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and No. 4 finish for exposed ducts.
- D. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.02 MANUAL VOLUME DAMPERS

- A. Manual Volume Damper Manufacturers:
 - 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Air Balance Inc.; a division of Mestek, Inc.
 - b. Leader Industries, Inc.
 - c. Pottorff; a division of PCI Industries, Inc.
 - d. Ruskin Company.
- B. Standard, Steel, Manual Volume Dampers:
 - 1. Standard leakage rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.
 - 3. Frames:
 - a. Hat-shaped, galvanized-steel channels, 0.064-inch minimum thickness.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 4. Blades:

- a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 - 5. Blade Axles: Galvanized steel.
 - 6. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 7. Tie Bars and Brackets: Galvanized steel.
 - C. Damper Hardware:
 - 1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
 - 2. Include center hole to suit damper operating-rod size.
 - 3. Include elevated platform for insulated duct mounting.
- 2.03 CONTROL DAMPERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Warming and Ventilating; a division of Mestek, Inc.
 - 2. Arrow United Industries; a division of Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Leader Industries, Inc.
 - 5. Ruskin Company.
 - B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
 - C. Frames:
 - 1. Hat shaped.
 - 2. Galvanized-steel channels, 0.064 inch thick.
 - 3. Mitered and welded corners.
 - D. Blades:
 - 1. Multiple blade with maximum blade width of 8 inches.
 - 2. Parallel- and opposed-blade design.
 - 3. *Control damper blades shall be airfoil, low leakage type. Crimped blade control dampers are not allowed.*
 - 4. 0.064 inch thick.
 - 5. Blade Edging: Closed-cell neoprene edging.
 - 6. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
 - 7. Blade Seals: Vinyl.
 - 8. Jamb Seals: Cambered stainless steel.
 - E. Blade Axles: 1/2-inch-diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 1. Operating Temperature Range: From minus 40 to plus 200 deg F.
 - F. Bearings:
 - 1. Oil-impregnated bronze.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 3. Thrust bearings at each end of every blade.
- 2.04 COMBINATION FIRE AND SMOKE DAMPERS
- A. *Combination Fire smoke dampers shall be Ruskin FSD60 or equal, Class I with 1 ½ Hour rating. Damper blades shall be airfoil type to ensure the lowest resistance to airflow. Provide with 120V electric actuator and all required mounting hardware..*
- 2.05 FIRE DAMPERS
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Arrow United Industries; a division of Mestek, Inc.
 - 2. Cesco Products; a division of Mestek, Inc.
 - 3. Greenheck Fan Corporation.
 - 4. Nailor Industries Inc.
 - 5. Prefco; Perfect Air Control, Inc.
 - 6. Ruskin Company.

- B. Type: Static, Type "C"; rated and labeled according to UL 555 by an NRTL.
 - C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000-fpm velocity.
 - D. Fire Rating: 1-1/2 and 3 hours.
 - E. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.
 - F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - 1. Minimum Thickness: 0.05 thick, as indicated, and of length to suit application.
 - 2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
 - G. Mounting Orientation: Vertical or horizontal as indicated.
 - H. Blades: Roll-formed, interlocking, 0.024-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.
 - I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
 - J. Heat-Responsive Device: Replaceable, 165 deg F rated, fusible links.
- 2.06 TURNING VANES
- A. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vaness and Vane Runners," and 2-4, "Vane Support in Elbows."
 - B. Vane Construction: Double wall.
- 2.07 DUCT-MOUNTED ACCESS DOORS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Warming and Ventilating; a division of Mestek, Inc.
 - 2. Cesco Products; a division of Mestek, Inc.
 - 3. Ductmate Industries, Inc.
 - 4. Flexmaster U.S.A., Inc.
 - 5. Greenheck Fan Corporation.
 - 6. Kees, Inc.
 - 7. Nailor Industries Inc.
 - 8. Pottorff; a division of PCI Industries, Inc.
 - 9. Ventfabrics, Inc.
 - B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
 - 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - d. Fabricate doors airtight and suitable for duct pressure class.
 - 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- 2.08 FLEXIBLE CONNECTORS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ductmate Industries, Inc.
 - 2. Duro Dyne Inc.
 - 3. Ventfabrics, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.
 - B. Materials: Flame-retardant or noncombustible fabrics.
 - C. Coatings and Adhesives: Comply with UL 181, Class 1.
 - D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to 2 strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
 - E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd..
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200 deg F.
- 2.09 FLEXIBLE DUCTS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flexmaster U.S.A., Inc.
 - 2. McGill AirFlow LLC.
 - 3. Thermaflex, A Division of Flexible Technologies, Inc.
 - 4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

- B. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.
 - 1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 10 to plus 160 deg F.
 - C. Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor-barrier film.
 - 1. Pressure Rating: 6-inch wg positive and 1.0-inch wg negative.
 - 2. Maximum Air Velocity: 5000 fpm.
 - 3. Temperature Range: Minus 20 to plus 210 deg F.
 - 4. Insulation R-value: Comply with ASHRAE/IESNA 90.1-2004.
 - D. Flexible Duct Connectors:
 - 1. Clamps: Nylon strap in sizes 3 through 18 inches, to suit duct size.
- 2.10 DUCT ACCESSORY HARDWARE
- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
 - B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install backdraft or control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
- D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - 1. Install steel volume dampers in steel ducts.
 - 2. Install aluminum volume dampers in aluminum ducts.
- E. Set dampers to fully open position before testing, adjusting, and balancing.
- F. Install test holes at fan inlets and outlets and elsewhere as indicated.
- G. Install fire and smoke dampers according to UL listing.
- H. Connect ducts to duct silencers rigidly.
- I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Control devices requiring inspection.
 - 3. Elsewhere as indicated.
- J. Install access doors with swing against duct static pressure.
- K. Access Door Sizes:
 - 1. One-Hand or Inspection Access: 8 by 5 inches.
 - 2. Two-Hand Access: 12 by 6 inches.
 - 3. Head and Hand Access: 18 by 10 inches.
 - 4. Head and Shoulders Access: 21 by 14 inches.
 - 5. Body Access: 25 by 14 inches.
 - 6. Body plus Ladder Access: 25 by 17 inches.
- L. Install flexible connectors to connect ducts to equipment.
- M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- N. Connect terminal units to supply ducts directly. Do not use flexible ducts.
- O. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.
- P. Install duct test holes where required for testing and balancing purposes.

3.02 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.

3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 33 00

SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Shutoff, single-duct air terminal units.

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" .

1.03 SUBMITTALS

- A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.

- B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

- C. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

1.04 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

PART 2 - PRODUCTS

2.01 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Anemostat.
2. Environmental Technologies, Inc.
3. JCI/York.
4. Nailor Industries Inc.
5. Price Industries.
6. Titus.
7. Trane.
8. Metalaire.

- B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

- C. Casing: 0.034-inch steel, single wall.

1. Casing Lining: Adhesive attached, 1/2-inch-thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.

3. Air Outlet: S-slip and drive connections, size matching inlet size.

4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.

5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

- D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.

2. Damper Position: Normally closed.

- E. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

2.02 SERIES FAN POWERED AIR TERMINAL UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Anemostat.
2. Environmental Technologies, Inc.
3. JCI/York.
4. Nailor Industries Inc.
5. Price Industries.
6. Titus.

7. Trane.
 8. Metalaire.
 - B. Configuration: Pressure independent with volume-damper assembly and fan in series arrangement inside unit casing with control components inside a protective metal shroud for installation above a ceiling.
 - C. Casing: 0.034-inch steel, single wall.
 1. Casing Lining: Adhesive attached, 1/2-inch-thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 2. Air Inlets: Round stub connections.
 3. Air Outlet: S-slip and drive connections.
 4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
 5. Fan: Forward-curved centrifugal, located at plenum air inlet.
 6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - D. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.
 1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
 2. Damper Position: Normally closed.
 - E. Velocity Sensors: Multipoint, center averaging.
 - F. Motor: Ultra high efficiency, brushless DC ECM motor with PWM controller that allows for 0-10v signal from DDC controller to adjust fan speed.
 1. Fan-Motor Assembly Isolation: Rubber isolators.
 2. Enclosure: Open dripproof.
 3. Enclosure Materials: Cast iron.
 4. Efficiency: Premium efficient.
 5. Electrical Characteristics: Refer to schedule on drawings.
 - G. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
 1. Location: Plenum air inlet.
 2. Stage(s): Refer to drawing schedule.
 3. Access door interlocked disconnect switch.
 4. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 5. Nickel chrome 80/20 heating elements.
 6. Airflow switch for proof of airflow.
 7. Fan interlock contacts.
 8. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 9. Low voltage control relays for staging of electric heating coil.
 - H. Factory-Mounted and -Wired Controls: Electrical components mounted in control box with removable cover. Incorporate single-point electrical connection to power source.
 1. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
 2. Wiring Terminations: Fan and controls to terminal strip. Terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
 3. Disconnect Switch: Factory-mounted, fuse type.
 - I. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.
- 2.03 HANGERS AND SUPPORTS
- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
 - B. Steel Cables: Galvanized steel complying with ASTM A 603.
 - C. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
 - D. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
 - E. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

3.02 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than 4 inches thick.
- C. Hangers Exposed to View: Threaded rod and angle or channel supports.
- D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- E. Attachments to the terminal box shall be "double nutted" to prevent loosening over time.

3.03 CONNECTIONS

- A. Install piping adjacent to air terminal unit to allow service and maintenance.
- B. Hot-Water Piping: In addition to requirements in Division 23 Section "Hydronic Piping," connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
- C. Connect ducts to air terminal units according to Division 23 Section "Metal Ducts."
- D. Connections to air terminal units shall be via hard ducts.

3.04 IDENTIFICATION

- A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

END OF SECTION 23 36 00

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Various types of diffusers, registers and grilles.
- B. Related Sections:
 - 1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Indicate drawing designation, room location, quantity, model number, size, and accessories furnished. Include with the shop drawings a room-by-room schedule indicating devices installed. Also note ceiling types and installations.
 - 3. Finishes shall be selected by the Architect. If Architect elects not to select color, all colors shall be white. Factory color samples shall be submitted with shop drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anemostat Products; a Mestek company.
 - b. Krueger.
 - c. METALAIRE, Inc.
 - d. Price Industries.
 - e. Titus.

2.02 DIFFUSER, REGISTER AND GRILLE TYPES

- A. Refer to the drawing schedules for material, finish, face size, face style, mounting, pattern and other accessories, options and parameters.
 - 1. Rectangular and Square Ceiling Diffusers:
 - 2. Louver Face Diffuser:
 - 3. Linear Bar Diffuser:
 - 4. Linear Slot Diffuser:
 - 5. Drum Louver:
 - 6. Security Grilles and Registers:
 - 7. Linear Bar Grille:

2.03 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect/Engineer for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.03 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 23 74 13 - PACKAGED DX ROOFTOP UNITS

PART 1 - GENERAL

1.1 REFERENCES

- A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems. (all)
- B. ETL Listed and Labeled
- C. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration. (all)
- D. Standard for Safety Heating and Cooling Equipment-Third Edition, UL 1995/CSA C22.2 236-05, dated February 18, 2005, with revisions through July 30, 2009 (all for cooling and for electric heat)
- E. Standard for Gas Unit Heaters And Gas-Fired Duct Furnaces ANSI Z83.8-2006, CSA 2.6-2006, Third Edition – 2006 (indirect gas-fired/e)
- F. Standard for Non-Recirculating Direct Gas-Fired Industrial Air Heaters, ANSI Z83.4/CSA 3.7 - 2003 with addenda ANSI Z83.4/CSA 3.7 - 2004a and addenda ANSI Z83.4/CSA 3.7 - 2006b (direct gas-fired/e)
- G. ANSI/ASHRAE/IESNA 90.1-2010 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.
- H. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.
- I. California Energy Commission Administrative Code - Title 20/24 - Establishes the minimum efficiency requirements for HVAC equipment installed in new buildings in the State of California. (all)
- J. ANSI/NFPA 70-1995 - National Electric Code. (all)
- K. International Fuel Gas Code (g/e)

1.2 SUBMITTALS

- A. Submit unit performance data including: capacity, nominal and operating performance.
- B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.
- C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.
- D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.
- E. Shop drawings submitted for approval shall be accompanied by a copy of the purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.

1.3 DELIVERY, STORAGE and HANDLING

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- B. Protect units from physical damage. Leave factory shipping covers in place until installation.

1.4 WARRANTY

- A. Unit shall subject to manufacturer's standard warranty for the following periods:
 - 1. Overall unit, 12 months including parts, labor and refrigerant from substantial completion.
 - a. Compressors, parts only, 60 months from substantial completion.
 - b. 10-year gas heat exchanger warranty.

1.5 REGULATORY REQUIREMENTS

- A. Unit shall conform to the appropriate standards listed in 1.1 References.
 - 1. In the event the unit is not approved by a Nationally Recognized Testing Laboratory (NRTL) for compliance with the appropriate standards, the manufacturer shall, at manufacturer's expense, provide for a field certification and labeling of unit by an NRTL to the appropriate standards. Manufacturer shall, at manufacturer's cost, complete any and all modifications required by NRTL prior to certification and field labeling. Manufacturer shall include coverage of all modifications in unit warranty.

1.6 EXTRA MATERIALS

- A. Provide Extra two set of filters. for both supply and exhaust systems.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following.
 - 1. Daikin
 - 2. Carrier
- B. Project is based on the specified equipment. Any additional costs associated with using alternate manufacturer's equipment shall be borne by the installing contractor or equipment provider.

- C. Vendor shall coordinate necessary procurement times with contractor and project schedule during bidding process.
- 2.2 CASING CONSTRUCTION
- A. Unit shall be constructed for outdoor installation on a roof curb, framing, or concrete pad.
 - B. Base
 - 1. Base rails shall be constructed of a minimum of 10 gage galvanized steel with 2" foam-injected double-wall floor, Insulated floor.
 - 2. Exterior of unit walls shall have a minimum 2" overhang over the top of a roof curb to prevent water infiltration.
 - 3. All floor seams shall have a raised rib joint.
 - 4. There shall be no penetrations through the floor of the unit within the perimeter of the curb except for duct openings and utility chases.
 - 5. Penetrations through the floor shall have a ½" raised rib around each opening.
 - C. Panels
 - 1. Casing shall be constructed with minimum 2-inch, foam-injected, double-wall panels.
 - 2. Individual panels shall be constructed so that they are thermally broken (there shall be no metal-to-metal contact between the interior and exterior sheet metal of each panel).
 - 3. Interior side of panel shall be 22 gage G-90 galvanized steel.
 - 4. Exterior side of panel shall be 22 gage painted steel rated for 2500 hours in accordance with ASTM B117 and ASTM D1654.
 - 5. Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 340/360. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors
 - 6. Insulation
 - a. Insulation shall be 2" 3 lb/ft foam insulation with an average R-value of 6 per inch.
 - b. Insulation water absorption must be no more that 0.038 lb/ft per ASTM D 2842 and show "no growth" per ASTM G21 biocide testing.
 - c. No insulation shall be exposed to the air stream.
 - d. Fiberglass insulation is not acceptable due to possibility of sloughing and moisture retention.
 - D. Access doors
 - 1. Hinged access doors shall be provided for access to all components requiring regular maintenance or inspection.
 - 2. Access doors shall have a minimum of two quarter-turn compression latches with adjustable catches.
 - 3. Access door construction shall be identical to unit casing.
 - 4. Interior side of access doors shall be 22 gage G-90 galvanized steel.
 - 5. Exterior side of panel shall be 22 gage painted steel rated for 2500hours in accordance with ASTM B117 and ASTM D1654.
 - 6. Access doors shall be sealed with a full-perimeter gasket constructed of Mylar-encased low-density foam.
 - 7. Insulation
 - a. Insulation of shall be 2 lb/ft3 foam insulation with an average R-value of 6 per inch. Access panels shall be constructed with minimum 2-inch, foam-injected, double-wall panels
 - b. Insulation water absorption must be no more that 0.038 lb/ft per ASTM D 2842 and show "no growth" per ASTM G21 biocide testing.
 - c. No insulation shall be exposed to the air stream.
 - d. Fiberglass insulation is not acceptable due to possibility of sloughing and moisture retention.
 - 8. IAQ Weather hood with bird screen shall be provided on outside air inlet.
 - 9. Roof shall be pitched with a minimum ½" roof overhang around the perimeter of the unit.
- 2.3 BLOWERS/MOTORS
- A. Blowers
 - 1. Fan assemblies shall be direct-drive without the use of belts or adjustable sheaves.
 - 2. Manufacturer shall provide a variable frequency drive for each fan section.
 - a. Exhaust fan VFD shall be provide with external set of contacts to allow control of exhaust fan and exhaust fan speed during non-occupied periods.
 - 3. Variable frequency drive shall be mounted, wired, and programmed by the manufacturer.
 - 4. Variable frequency drive shall be located in an enclosed compartment outside of the supply or exhaust air stream.
 - 5. Fans shall be backward inclined plenum type on supply and exhaust blowers.

6. Blower wheels shall be constructed of welded aluminum.
 7. Where scheduled provide plenum fan array for supply air stream to fully condition air across the DX coil.
 8. Fan wheel shall be tested in accordance to AMCA 210.
 9. Blowers and motors shall be dynamically balanced and mounted on rubber isolators
 10. The airflow monitoring system shall be manufactured by Greenheck Sure-Air or approved equal. The system must not induce any effects on the fan performance and shall be an integral part of the plenum fan bell-mouth. The system is used to read the volumetric flow rate as listed in the schedule.
- B. Motors
1. Motors shall be standard (premium) efficiency ODP with ball bearings rated for 200,000 hours service with external lubrication points Fan motor shall be of premium efficiency (PE).
 2. Fan motors to be provided with shaft grounding rings
- C. Dampers
1. Motorized dampers
 - a. Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge and end seals. Damper blades shall be gear driven and designed to have no more than 20 cfm of leakage per sq ft. at 4 in. w.g. air pressure differential across the damper. Low leakage dampers shall be Class 2 AMCA certified, in accordance with AMCA Standard 511. Damper assembly shall be controlled by spring return (DDC) actuator. Unit shall include outside air opening bird screen, outside air hood and barometric relief dampers.
- 2.4 FILTERS
- A. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
1. Provide filters at the following locations:
 - a. Outdoor air Stream
 - b. Return air stream
 - c. Supply air stream
 2. Filter racks shall be designed to handle a maximum 2" thick high efficiency filter.
 - a. Filters shall be replaceable through side access, hinged access door.
 3. Replaceable Filter Media: 4 inch MERV 14 (supply) or greater rating in accordance with ASHRAE Test Standard 52.2.
 - a. Filters shall be High Capacity, 2-inch MERV 8 (Exhaust) extended area filters with air quantities to match units supply air fan
 - b. Clean pressure drops of 0.1-inch wg, dirty pressure drop of 0.75-inch ww.
- 2.5 COOLING
- A. Air Cooled DX
1. Unit shall be provided with factory piped, charged, and tested packaged air-cooled direct expansion refrigeration system.
 2. Refrigeration systems be equipped with variable speed capacity control. Variable Speed compressors should be provided unless they are not an option in which case digital scroll compressors shall be used.
 3. Refrigeration system shall include microprocessor-based head pressure control logic to maintain refrigerant pressures by actively modulating condenser airflow (Active Head Pressure Control).
 4. Where specified in the contract document schedules, provide heat pump heating on unit for heating. Where heat pump is to be used for heating, provide auxiliary gas heater for when outdoor air temperatures are too low or heat pump heating capacity is insufficient.
 5. Thermal expansion valves
 - a. Refrigeration system shall be provided with thermal expansion valve (TXV) incorporating adjustable superheat.
 6. Evaporator coil
 - a. Coil shall be rated in accordance to ARI standards and pressure tested for 250 psi working pressure.
 - b. Coil shall be a minimum of 4 rows deep.
 - c. Refrigeration systems with more than one circuit shall have interlaced evaporator coils.
 - d. Coil casing shall be constructed of 16 gage stainless steel casing.
 - e. Coil tubes shall be constructed of 1/2" diameter, 0.016" thick seamless copper tubing.
 - f. Coil fins shall be constructed of 0.0060" thick aluminum.
 7. Drain pan
 - a. Drain pan shall be constructed of a minimum of 18 gage 304 stainless steel.
 - b. Drain pan shall be double-sloped to ensure condensate removal from unit.

- c. Drain pan shall extend a minimum of 8" past the evaporator coil to ensure condensate retention.
- d. Unit mounted condensate over flow switch.
- 8. Compressors
 - a. Compressors shall be variable speed hermetic scroll type and include the following items:
 - 1) Suction and discharge service valves.
 - 2) Reverse rotation protection.
 - 3) Oil level adjustment.
 - 4) Oil filter.
 - 5) Rotary dirt trap.
 - 6) Short cycling control.
 - 7) High and low pressure limits.
 - 8) Crankcase heaters.
 - b. Compressors shall be installed in an isolated compartment separate from supply airflow, return airflow, microprocessor controller, non-fused disconnect, compressor relays, fan motor VFD, and all other electrical components inside the unit.
 - c. Compressors shall be installed using manufacturer's recommended rubber vibration isolators.
 - d. Unit to be provided min of one inverter scroll compressor on first and or second stage of cooling capable of 10:1 turndown.
 - e. All other refrigeration circuits shall utilize a standard scroll compressor.
- 9. Condenser coils
 - a. Condenser coils shall be constructed of copper tube with mechanically bonded aluminum fins. Microchannel coils are not acceptable.
 - b. Condensing section shall include factory provided with installed condenser coil hail guards.
- 10. Condensing fans – Active Head Pressure Control 1.0
 - a. Condensing section shall be equipped with 1140 rpm direct-drive condensing fans.
 - b. Condensing fan assembly shall be statically and dynamically balanced in accordance with AMCA Standard 204-05.
 - c. Condensing fan assembly shall consist of aluminum-bladed propeller fan wheel, formed-channel base, formed inlet venturi, and coated steel basket guard on the discharge.
 - d. A factory-supplied variable frequency drive shall be provided to modulate a single condensing fan to maintain refrigerant pressure in the condensing section.
 - e. All additional condensing fans shall enable/disable to maintain refrigerant pressure in the condensing section.
- 11. Condensing fans – Active Head Pressure Control
 - a. Condensing section shall be equipped with high-performance 1200 rpm condensing fans.
 - b. Condensing fan blades shall be constructed out of a polymer, sickle-shaped blades with serrated trailing edges for sound reduction. Condensing fan blades shall be constructed out of aluminum with a serrated trailing edge.
 - c. Condensing fan motor shall be electrically-commutated and capable of full modulation without the need for an external variable frequency drive.
 - d. All condensing fans shall modulate at the same speed to maintain the head pressure set point in the factory-provided microprocessor controller.
- 2.6 MODULATING GAS FURNACE
 - A. Unit shall be furnished with fully modulating gas furnace
 - B. Provide carbon monoxide (CO) sensor in room that supply air discharges to first from the unit. When CO is triggered, unit shall shut-down.
- 2.7 ELECTRICAL
 - A. Units shall be factory wired with a single point power connection.
 - B. Units shall be wired according to NEC and listed per ETL.
 - C. ETL listing shall cover all components of the ventilator and not be limited to the control panel.
 - D. All major electrical components shall be UL listed.
 - E. Unit shall be constructed with an integral control center isolated from supply airflow, exhaust airflow, compressors, and heating elements.
 - F. The following items shall be provided and wired within the control center by the factory:
 - 1. Non-fused disconnect.
 - 2. Sub-circuit fusing.
 - 3. Low voltage transformers.
 - 4. Control circuit fusing.

5. Terminal block.
6. Fan motor variable frequency drives.
7. Electrical panel must house all high voltage components such as terminal blocks, variable frequency drives, and fuse blocks.
8. Accessories
 - a. Control panel shall include a factory supplied and mounted 115V GFCI convenience outlet receptacle with a 12A circuit breaker. Outlet shall be powered by [factory, others in the field].
 - b. Unit shall include a factory supplied, mounted, and wired phase and voltage monitor.
9. Unit shall be provided with phase and brown out protection which shuts down all motors in the unit if the electrical phases are more that 10% out of balance on voltage, the voltage is more that 10% under design voltage, or on phase reversal.

2.8 CONTROLS

A. General:

1. Units shall include factory supplied, mounted, wired, and tested stand-alone microprocessor controller.
2. Microprocessor controller shall be factory-programmed for discharge air control.
3. Microprocessor controller shall be mounted in a weather-proof enclosure and accessible without exposing the operator to high voltage wiring or having to turn off or circumvent the main disconnect.
4. Microprocessor controller shall include local liquid crystal display (LCD) for user interface.
5. The following sensors shall be factory supplied, mounted, and wired inside the unit:
 - a. Outdoor air humidity sensor.
 - b. Outdoor air temperature sensor.
 - c. Evaporator coil leaving air temperature sensor.
 - d. Supply air filter pressure monitoring.
6. The following devices shall be factory supplied but ship loose and require field installation and wiring:
 - a. Return/ mounted air humidity sensor.
 - b. Supply air temp temperature sensor.
 - c. Supply and Exhaust Duct static pressure sensor.
7. Unit shall be controlled via remotely located physical control panel in mechanical room in addition to any software application controller.
8. Provide multiple space temperature sensors (refer to drawings for quantity and locations) with tie in to controller to control unit.
9. Provide auxiliary contacts for controlling exhaust fans, etc...on when RTU turns on.

B. DDC Controller:

1. Controller shall have volatile-memory backup.
2. Refrigerant Circuit Operation:
 - a. Occupied Periods: Cycle or stage compressors to match compressor output to cooling load to maintain temperature. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
 - b. Unoccupied Periods: Cycle compressors and condenser fans for heating to maintain setback temperature.
 - c. Switch reversing valve for heating or cooling mode on air-to-air heat pump.
3. Hot-Gas Reheat-Coil Operation:
 - a. Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
 - b. Unoccupied Periods: Reheat not required.
4. Gas Furnace Operation:
 - a. Occupied Periods: Modulate burner to maintain temperature.
 - b. Unoccupied Periods: Modulate burner to maintain setback temperature.

C. Interface Requirements for HVAC Instrumentation and Control System:

1. BACnet Interface cards shall be installed and started up by equipment manufacturer's representative. BACnet cards shall be 76.8 KBPS baud rate. They shall be compatible with Alerton or Automated Logic. They shall be connected as read only. The contractor shall coordinate the work associated with the BACnet cards so the manufacturer and HVAC controls subcontractor are present at the same time during programming of the cards. No start/stop of the equipment is allowed utilizing the BACnet interface.
2. Interface to CS shall include enable/disable and general alarm and the following info.
 - a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
 - c. Adjusting set points.
 - d. Monitoring supply fan start, stop, and operation.

- e. Inquiring data to supply temperature and humidity.
 - f. Monitoring occupied and unoccupied operations.
 - g. Monitoring variable-frequency drive operation.
 - h. Monitoring cooling load.
 - i. Monitoring air-distribution static pressure and ventilation air volume.
- D. Sequence of Operations
1. Mode Enable Sensor Options
 - a. The Outside Air Temperature Sensor shall be configured as the Mode Enable Sensor during the Occupied Mode.
 2. Occupied Mode Initiation: BACnet command
 3. HVAC Modes of Operation: There are 5 possible HVAC Modes of Operation:
 - a. Cooling Mode
 - b. Heating Mode
 - c. Vent Mode
 - d. Dehumidification Mode
 - e. Off Mode
 4. Cooling Mode with Variable Capacity Compressor(s)
 - a. Cooling is enabled when the temperature at the Mode Enable Sensor rises one deadband above the Cooling Setpoint. Cooling is disabled when the Mode Enable temperature falls one deadband below the Cooling Setpoint. The setpoint and deadband are user adjustable.
 - b. In the cooling mode, as the Supply Air Temperature (SAT) rises above the Active Supply Air Cooling Setpoint (see Supply Air Temperature Setpoint Reset section for explanation), compressors will modulate and stage based on the unit configuration in order to control to the Active Supply Air Cooling Setpoint.
 - c. Each stage must meet its Minimum Off Time (adj.) before it is allowed to energize and successive stages can energize if the SAT rises above the Active Supply Air Cooling Setpoint for the Cooling Stage Up Delay period (adj).
 - d. For compressors to stage down Minimum Run Times (adj.) must be satisfied, and the SAT needs to be below the Active Supply Air Cooling Setpoint minus the Cooling Stage Control for a period of time equal to the Stage Down Delay.
 - e. Mechanical cooling is disabled if the Outdoor Air Temperature (OAT) falls 1° below the Cooling Lockout Setpoint and will remain disabled until the OAT rises 1° above the Cooling Lockout Setpoint. If the OAT disables mechanical cooling while it is currently operating, mechanical cooling will stage off as minimum run times and stage down delays are satisfied.
 - f. If the Economizer is enabled it will function as the first stage of cooling (see Economizer section). (RTU-D2)
 5. Heating Mode
 - a. Available heating options are Modulating Gas.
 - b. Heating is enabled when the temperature at the Mode Enable Sensor falls one deadband below the Heating Setpoint. Heating is disabled when the Mode Enable temperature rises one deadband above the Heating Setpoint.
 - c. In the Heating Mode, as the Supply Air Temperature falls below the Active Supply Air Heating Setpoint (see Supply Air Temperature Setpoint Reset section for explanation), the heating will begin to stage on or to modulate. Each stage must meet its Minimum Off Time (adj.) before it is allowed to energize and successive stages are subject to a Heating Stage Up Delay (adj).
 - d. Heating stages will continue to run until the supply air temperature rises above the Active Supply Air Temperature Setpoint plus the Heating Stage Control Window at which point the heating will begin to stage off. Each stage must meet its Minimum Run Time (adj.) before it is allowed to stage off, and successive stages are subject to a Heating Stage Down Delay (adj.).
 - e. Mechanical heating is disabled if the Outdoor Air Temperature (OAT) rises 1° above the Heating Lockout Setpoint and will remain disabled until the OAT falls 1° below the Heating Lockout Setpoint. If the OAT disables mechanical heating while it is currently operating, mechanical heating will stage off as minimum run times and stage down delays are satisfied.
 6. Dehumidification Mode
 - a. In Occupied Vent Mode Only—Dehumidification can only be initiated in the Occupied Mode when there is no call for Heating or Cooling. This creates a Vent Dehumidification Mode.
 7. Dehumidification Mode with Variable Capacity Compressor(s) and Optional Fixed Compressor(s)

- a. Dehumidification shall be selected as a priority mode and shall be active anytime the humidity is above the Indoor Humidity Setpoint, otherwise it is only available when heating and cooling demands are satisfied (Vent Mode).
- b. Once in dehumidification, the unit will modulate and stage compressors based on the unit configuration in order maintain the Evaporator Coil Suction (Saturation) Temperature at the Coil Suction (Saturation) Temperature Setpoint.
- c. A coil suction pressure sensor is required and is typically factory installed.
- d. Dehumidification Reheat is always controlled to the appropriate Active Supply Air Temperature Setpoint which will be dependent on whether you are in Cooling Dehumidification, Heating Dehumidification, or Vent Dehumidification. During Vent Mode Dehumidification the Supply Air Temperature Setpoint is calculated to be halfway between the HVAC Mode Setpoints.
- e. Reheat shall be accomplished by modulating hot gas reheat.
8. Ventilation Mode: This mode is only available in the Occupied Mode of operation on units configured for continuous supply fan operation and is generated anytime there is no demand for heating or cooling. The fan will operate at the Minimum Vent speed (user adj).
9. Off Mode
 - a. Occurs in the Unoccupied Mode.
 - b. Supply and exhaust fan is off and the outside air damper is closed.
10. Supply
 - a. Occupied Mode – Supply and exhaust fan can be configured to run.
11. Airflow Control of Supply and Exhaust Fan
 - a. Outdoor, and Exhaust Airflow shall be monitored using Ebtron or equal Airflow Stations. Each unit shall be supplied with supply air flow monitoring stations.
 - b. The airflow monitoring system shall be manufactured by Greenheck Sure-Air or approved equal. The system must not induce any effects on the fan performance and shall be an integral part of the plenum fan bell-mouth. The system is used to read the volumetric flow rate as listed in the schedule.
12. Head Pressure Control
 - a. Using Refrigerant System Module(s), monitor head pressure transducers and control multiple condenser fans or valves to maintain the head pressure setpoint.
 - b. Different head pressure setpoints are used for Cooling Mode and Dehumidification Reheat Mode
13. Supply Air Temperature Setpoint Reset
 - a. Reset supply air temperature based on the outdoor air temperature.
 - b. For whatever option is selected, a High and a Low Reset Source Setpoint must be configured that will correspond to configured Low and High SAT Setpoints. This must be done separately for the Cooling Mode setpoints and for the Heating Mode setpoints.
 - c. When the Reset Source is at its highest configured setpoint the SAT Setpoint will be reset to its lowest configured setpoint. When the Reset Source is at its lowest configured setpoint the SAT Setpoint will be reset to its highest configured setpoint.
 - d. In all cases as the Reset Source value moves within its range established by the configured High and Low Reset Setpoints, the Supply Air Setpoint will be proportionally reset within its range established by the configured Low and High SAT Setpoints.
 - e. If Dehumidification in All Modes has been configured and the unit is in Cooling Dehumidification or the Heating Dehumidification Mode, the SAT reset will occur as described above.
 - f. In the Vent Mode or the Vent Dehumidification Mode, the SAT Setpoint will be calculated to be halfway between the HVAC Mode Enable Setpoints.
14. Coil Temperature Reset During Dehumidification
 - a. The Indoor Humidity (Space or Return Air) will be used to reset the Coil (Saturation) Temperature Setpoint during Dehumidification.
 - b. A user adjustable indoor humidity range can be created to proportionally reset the Coil (Saturation) Airflow Monitoring
 - c. Outdoor, Supply, Return and Exhaust Airflow can be monitored using specific Ebtron, Paragon, or GreenTrol Airflow Stations. Contact the factory of the models that can be used.
 - d. The Outdoor Air Damper can be controlled to maintain an Outdoor Air CFM Setpoint.
15. Heat Wheel Operation: If the unit is configured for Outdoor Air Temperature Control, the Heat Wheel Relay will disable in between the Outdoor Air Cooling and Heating Setpoints (Outdoor Air Vent Mode)
16. Proof of Flow Interlock
 - a. A Proof of Flow switch (by others) provides a 24 VAC wet contact closure when the supply fan is operating.

- b. If this contact opens while the fan is being called to run, all heating and cooling is disabled and a Fan Proving Alarm is generated.
- 17. Dirty Filter Status: A differential pressure switch (by others) is used to provide a 24 VAC wet contact closure to indicate a dirty filter status. A Dirty Filter Alarm is then generated.
- 18. Emergency Shutdown: A 24 VAC wet contact input is available to be used with a N.C. Smoke Detector, Firestat, or other shutdown condition occurs. If this contact opens, it will initiate immediate shutdown of the VCCX2 and will generate an alarm condition.
- 19. Remote Contact Control
 - a. A Remote Contact Control option can be configured to initiate the HVAC Modes of operation.
 - b. All Heating, Cooling, and Dehumidification modes will only be initiated based on 24 VAC wet contact closures on the Forced Heating, Forced Cooling, and Forced Dehumidification. This is a single configuration that applies to all 3 modes.
- 20. Temperature Protection
 - a. Activated when the Supply Air Temperature (SAT) rises above the High Cutoff Temperature (immediate) or drops below the Low Cutoff Temperature (for 10 minutes) both of which are user adjustable. This mode shuts off the unit (with a 3 minute fan off delay) until the mode is cancelled.
 - b. This mode is cancelled when the SAT drops 10 degrees below the High Cutoff Temperature Setpoint or rises 10 degrees above the Low Temp Cutoff Temperature Setpoint, or when the unit changes back into Occupied Operation.
- 21. Outdoor Air Lockouts
 - a. Mechanical cooling is disabled when the Outdoor Air Temperature is below the Cooling Lockout Setpoint.
 - b. Mechanical heating is disabled when the Outdoor Air Temperature is above the Heating Lockout Setpoint.
- 22. Alarm Detection and Reporting
 - a. Continuously performs self-diagnostics during normal operations to determine if any operating failures have occurred.
 - b. These failures (alarms) will be shown on the controller's display, and can be reported to a wall mounted System Manager (requires a MiniLink 5 Device), the Touch Screen System Manager (certain alarms), a Hand Held Modular Service Tool, or to a computer running Prism II software.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.
- C. Examine roof curbs and equipment supports for suitable conditions where units will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's rigging and installation instructions for unloading units and moving to final locations.
- B. Curb Support: Install roof curb on roof structure according to "The NRCA Roofing Manual."
 - 1. Install and secure units on curbs and coordinate roof penetrations and flashing with roof construction.
 - 2. Coordinate size, installation, and structural capacity of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."
 - 3. Coordinate size, location, and installation of unit manufacturer's roof curbs and equipment supports with roof Installer.
- C. Install separate devices furnished by manufacturer and not factory installed.
- D. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

3.3 CONNECTIONS

- A. Where installing piping adjacent to units, allow space for service and maintenance.
- B. Duct Connections:
 - 1. Comply with requirements in Division 23 Section "Metal Ducts."
 - 2. Drawings indicate the general arrangement of ducts.
 - 3. Connect ducts to units with flexible duct connectors. Comply with requirements for flexible duct connectors in Division 23 Section "Air Duct Accessories."
- C. Electrical Connections: Comply with requirements for power wiring, switches, and motor controls in Division 26 Sections.
 - 1. Install electrical devices furnished by unit manufacturer but not factory mounted.

3.4 FACTORY VERIFICATION TESTING

- A. Unit shall be run tested prior to shipment from the factory.
- B. Factory run test report shall be provided at the request of the engineer, contractor, or owner.
- C. Testing Procedures
- D. Unit shall be subjected to and pass a dielectric (hipot) test.
- E. All motorized dampers shall be cycled one full stroke while installed in the unit using the factory-provided motorized actuators.
- F. Supply fan
 - 1. Visually inspect ramp-up, ramp-down, and rotation direction of fan when enabled.
 - 2. Verify fan pressure proving switch operation.
 - 3. Measure and record current draw through supply fan motor(s).
- G. Indirect gas furnace
 - 1. Indirect gas furnace shall be run tested while installed inside unit with 8.5 in.wg of natural gas.
 - 2. Measure and record leaving air temperature and manifold pressure at minimum fire.
 - 3. Measure and record leaving air temperature and manifold pressure and maximum fire.
- H. Condensing fans
 - 1. Ensure fans rotate freely without obstruction.
 - 2. Energize fans and ensure proper rotation.
 - 3. Measure and record the amount of current draw through each condensing fan.
- I. Refrigeration system
 - 1. Measure and record subcooling and superheat on circuit A with hot-gas reheat valve closed (0%) after 15 minutes of steady-state operation.
 - 2. Measure and record subcooling and superheat on circuit A with hot-gas reheat valve open (100%) after 15 minutes of steady-state operation.
 - 3. Measure and record subcooling and superheat on circuit B after 15 minutes of steady-state operation.
- J. Test report shall be included with unit and available from the factory upon request.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Inspect units for visible damage to refrigerant compressor, condenser and evaporator coils, and fans.
 - 3. Start refrigeration system when outdoor-air temperature is within normal operating limits and measure and record the following:
 - a. Cooling coil leaving-air, dry- and wet-bulb temperatures.
 - b. Cooling coil entering-air, dry- and wet-bulb temperatures.
 - c. Condenser coil entering-air dry-bulb temperature.
 - d. Condenser coil leaving-air dry-bulb temperature.
 - 4. Inspect casing insulation for integrity, moisture content, and adhesion.
 - 5. Verify that clearances have been provided for servicing.
 - 6. Verify that controls are connected and operable.
 - 7. Verify that filters are installed.
 - 8. Clean coils and inspect for construction debris.
 - 9. Verify bearing lubrication.
 - 10. Clean fans and inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - 11. Adjust fan belts to proper alignment and tension.
 - 12. Start unit.
 - 13. Inspect and record performance of interlocks and protective devices including response to smoke detectors by fan controls and fire alarm.
 - 14. Operate unit for run-in period.
 - 15. Calibrate controls.
 - 16. Adjust and inspect high-temperature limits.
- B. After startup, change filters, verify bearing lubrication, and adjust belt tension.
- C. Remove and replace components that do not properly operate and repeat startup procedures as specified above.
- D. Prepare written report of the results of startup services.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units and record training session with digital video recorder.

END OF SECTION

SECTION 26 00 00 - COMMON ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes common requirements for the entire project.

1.03 GENERAL

- A. The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub-Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- B. Each Contractor shall be governed by any alternates, unit prices and addenda or other contract documents insofar as may affect the work or services.
- C. The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of the complete and operating Electrical System(s) indicated and/or specified in the Contract Documents.
- D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Electrical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.
- E. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensation.
- F. It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime agreement, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the Contractor to the Architect (if applicable), then to the Engineer.
- G. This section of the Specifications or the arrangement of the Contract Documents shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.
- H. It is the intent of this Contract to deliver to the Owner a new and complete project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.
- I. In general, and to the extent possible, all work shall be accomplished without interruption of facility operations. The Contractor shall advise the Architect, Owner and Engineer in writing at least one week prior to the deliberate interruption of any services. The Owner shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.
- J. Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without requests for extra compensation to the Owner, except where otherwise provided for in the contract for the work.

1.04 DEFINITIONS

- A. Architect: The Architect of Record for the project, if any.
- B. Contract Documents: All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to, plans, specifications, addenda, instructions to bidders (both General and Sub-Contractors), unit prices, shop drawings, field orders, change orders, cost breakdowns, construction manager's assignments, architect's supplemental instructions, periodical payment requests, etc.
 - 1. Note: Any reference within these specifications to a specific entity, i.e. "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity.

Such assignments of responsibility are the responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.

- C. Contractor: Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of electrical work (Electrical, Low Voltage, Fire Alarm, etc.) or, the General Contractor.
 - D. Engineer: The Consulting Mechanical-Electrical Engineers either consulting to the Owner, Architect, other Engineers, etc.
 - E. Furnish: Deliver to the site in good condition.
 - F. Install: Install equipment furnished by others in complete working order.
 - G. Provide: Furnish and install in complete working order.
- 1.05 INTENT
- A. It is the intention of the Contract Documents to provide finished work, tested and ready for operation.
 - B. Minor details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.
- 1.06 DRAWINGS AND SPECIFICATIONS
- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The Contract Drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Contractor shall anticipate that additional offsets may be required without additional cost to the Owner and submit their bid accordingly.
 - B. The drawings and specifications are intended to supplement each other. No Contractor shall take advantage of conflict between them, or between parts of either. This also includes potential conflicts with regards to equipment and material model numbers, part numbers, etc. and respective description and/or performance. Should this condition exist, the Contractor shall request a clarification not less than 10 days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.
 - C. The drawings and specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.
 - D. Contractor shall make all necessary and required measurements in the field and shall be responsible for correct fitting. The work shall be coordinated with all other branches of work in such a manner as to cause a minimum of conflict or delay.
 - E. The Engineer shall reserve the right to make adjustments in location of conduit, fixtures, outlets, switches, etc. where such adjustments are in the interest of concealing work or presenting a better appearance. Unless a formal proposal request is issued, this work shall be performed without additional cost to the Owner.
 - F. Each Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Electrical equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.
 - G. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.
 - H. The Electrical drawings are intended to show the approximate locations of equipment, materials, conduit, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to ensure no conflict with other work. In case of conflict between small and large scale drawings, the larger scale drawings shall take precedence.
 - I. The Electrical Contractor and his Sub-Contractors shall review all construction documents in detail as they may relate to his work (structural, architectural, site survey, mechanical, etc.). Review all drawings for general coordination of work, responsibilities, ceiling clearances, wall penetrations points, chase access, fixture elevations, etc. Make any pertinent coordination or apparent conflict comments to the Engineer at least ten days prior to bids, for issuance of clarification by written addendum.
 - J. The Electrical Contractor and his Sub-Contractors shall ensure there is adequate space to install the equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without additional expense to the Owner and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to ensure adequate spaces.
 - K. Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting

only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

- L. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work without additional cost to the Owner, the same as if herein specified or indicated.
- M. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.
- N. Always check ceiling heights indicated on Architectural Documents and ensure they can be installed appropriately and that they may be maintained after all mechanical and electrical equipment is installed. If a conflict is apparent, notify the Engineer in writing for instructions. Do not install equipment in the affected area until the conflict is resolved.

1.07 EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests approval of materials and/or equipment of different physical size, weight, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, etc.
- B. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall compensate them for all necessary changes in their work. Any drawings, specifications, diagram, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense.
- C. Review of shop drawings, submittals, etc. by the Engineer does not in any way absolve the Contractor of the responsibilities of equipment and materials substitutions or deviations.
- D. Even with any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the preceding provisions are met.
- E. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineer.
- F. Each Contractor shall furnish along with the proposal a list of requested equipment and materials which is to be provided. Where several makes are mentioned in the specifications and the Contractor fails to state which they propose to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not ensure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings are satisfactorily comparable to the items specified and/or indicated.
- G. Each Contractor shall give written notice to the Architect/Engineer 5 days prior to the submission of a proposal of any materials or apparatus believed inadequate or unsuitable; in violation of codes, laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system without additional cost to the Owner.

1.08 COST BREAKDOWNS

- A. Within thirty days after acceptance of the Contract, each Contractor is required to furnish to the Engineer one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made on forms provided or approved by the Engineer or Architect. Payments will not be made until satisfactory cost breakdowns are submitted.

1.09 GUARANTEES AND WARRANTIES

- A. Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as lighting, generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of submittal and at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee.

1.10 RECORD DRAWINGS

- A. The Contractor shall ensure that any deviations from the design are being recorded daily or as necessary on record drawings being maintained by the Contractor. Dimensions from fixed, visible permanent lines or landmarks shown in vertical and horizontal ways shall be utilized. Compliance shall be a requirement for final payment. Pay particular attention to the location of underfloor or underground exterior in-contract or utility-owned or leased service lines, main switches and other appurtenances important to the maintenance and safety of the Electrical System. Deliver these record drawings to the Engineer as a system is completed, within ten days of the mark-up and/or while the accuracy of the mark-ups can be verified visually. Monthly payment may be withheld if the requirement is not complied with.

1.11 EXAMINATION OF SITE AND CONDITIONS

- A. Each Contractor shall be responsible for the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work.
- B. Each Contractor shall carefully examine all Drawings and Specifications and inform themselves of the kind and type of materials to be used throughout the project and which may, in any way, affect the execution of his work
- C. Each Contractor shall fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of temporary or permanent utilities, etc. The Contractor shall include in his work all expenses or disbursements in connection with such matters and conditions. Each Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum. No allowance is to be made for lack of knowledge concerning such conditions after bids are accepted.

1.12 SURVEYS, MEASUREMENTS AND GRADES

- A. Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.
- B. Contractor shall base all measurements, both horizontal and vertical from established benchmarks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.
- C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer thru normal channels of job communication and shall not proceed with his work until he has received instructions from the Engineer.

1.13 QUALIFICATIONS OF WORKMEN

- A. The installation of all Electrical Work shall be performed by licensed electricians and in accordance with current State Law. All Electrical Contractors bidding this project must have been a licensed company for a minimum of three years to qualify to bid this project. Individual employee experience does not supersede this requirement.
- B. All subcontractors bidding the electrical work must have completed one project of 70% this subcontract cost size and two projects of 50% this subcontract cost size.
- C. All electrical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen as evidenced by their workmanship shall be relieved of their responsibilities in those areas. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workmen shall refrain from work in areas not satisfactory to him. Requests for relief of a workman shall be made through the normal channels of responsibility established by the Architect or the contract document provisions.
- D. All electrical work shall be accomplished by Journeymen electricians under the direct supervision of a licensed Electrician. All applicable codes, utility company regulations, laws and permitting authority of the locality shall be fully complied with by the Contractor.
- E. Special electrical systems, such as Fire Detection and Alarm Systems, Intercom or Sound Reinforcement Systems, Telecommunications or Data Systems, Lightning Protection Systems, Video Systems, Special Electronic Systems, Control Systems, etc., shall be installed by workmen normally engaged or employed in these respective trades. As an exception to this, where small amounts of such work are required and are, in the opinion of the Engineer, within the competency of workmen directly employed by the Contractor involved, they may be provided by this Contractor.

1.14 CONDUCT OF WORKMEN

- A. The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workmen to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt permanent dismissal of that workman from the project. The possession, consumption or influence of alcoholic beverages, narcotics or illegally used controlled substances on the jobsite is strictly forbidden. Possession of a fire-arm is prohibited and may result in prosecution. Foul or bad language, graffiti is strictly prohibited. Display of nude tattoos is prohibited.

1.15 SUPERVISION OF WORK

- A. The Contractor shall personally supervise the work for which they are responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act on behalf of the Contractor.

1.16 MATERIALS AND WORKMANSHIP

- A. All electrical equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by electricians skilled and regularly employed in their respective trades. The Contractor shall determine that the equipment he proposes to furnish can be brought into the building(s) and installed within the space available. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s).
- B. All conduit and/or conductors shall be concealed underground, within crawl space in or below walls, floors or above ceilings unless otherwise noted. All fixtures, devices and wiring required shall be installed to make up complete systems as indicated

on the drawings and specified herein. Raceways shall not be placed within foundation walls and footings. See notes on plans about the limitation on work allowed to be installed within the crawl space.

- C. All materials, where applicable, shall bear Underwriters' Laboratories label or that of another Engineer-approved testing agency, where such a standard has been established.
- D. Each length of conduit, wireway, duct, conductor, cable, fitting, fixture and device used in the electrical systems shall be stamped or indelibly marked with the maker's mark or name.
- E. All electrical equipment shall bear the manufacturer's name and address and shall indicate its electrical capacity and characteristics.
- F. All electrical materials, equipment and appliances shall conform to the latest standards of the National Electric Manufacturers Association (NEMA) and the National Board of Fire Underwriters (NBFU) and shall be approved by the Owner's insuring agency if so required.

1.17 COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Plumbing, Fire Protection, Mechanical and Structural Drawings, to the end that complete coordination between trades will be affected. Each Contractor shall make know to all other contractors the intended positioning of materials, raceways, supports, equipment and the intended order of his work. Coordinate all work with other trades and proceed with the installation in a manner that will not create delays for other trades or affect the Owner's operations.
- B. Special attention to coordination shall be given to points where raceways, fixtures, etc., must cross other ducts or conduit, where lighting fixtures must be recessed in ceilings, and where fixtures, conduit and devices must recess into walls, soffits, columns, etc. It shall be the responsibility of each Contractor to leave the necessary room for other trades. No extra compensation or time will be allowed to cover the cost of removing fixtures, devices, conduit, ducts, etc. or equipment found encroaching on space required by others.
- C. The Contractor shall be responsible for coordination with all trades to ensure they have made provisions for connections, operational switches, disconnect switches, fused disconnects, etc., for electrically operated equipment provided under this or any other division of the specifications, or as called for on the drawings. Any connection, circuiting, disconnects, fuses, etc., that are required for equipment operation shall be provided as a part of this contract.
- D. If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other trade's work, each trade shall report such discrepancies to the Engineer far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of fixtures, devices, conduit, and equipment not installed or connected in accordance with the above instructions.
- E. In all areas where air diffusers, devices, luminaires and other ceiling-mounted devices are to be installed, the Mechanical Trade(s) and the Electrical Trade and the General Trades shall coordinate their respective construction and installations so as to provide a combined symmetrical arrangement that is acceptable to the Engineer. Where applicable, refer to reflected ceiling plans. Request layouts from the Engineer where in doubt about the potential acceptability of an installation.

1.18 INTERFACING

- A. Each Electrical Trade, Specialty Controls Trade, Mechanical Trade and the General Trades, etc., shall ensure that coordination is affected relative to interfacing of all systems. Some typical interface points are (but not necessarily all):
 1. Connection of Telecommunications (voice, video, data) lines to Owner's existing or new services.
 2. Connection of Power lines to Owner's existing or new services.
 3. Connection of all controls to equipment.
 4. Electrical power connections to electrically operated (or controlled) equipment.
 5. Electrical provisions for all equipment provided by other trades or suppliers within this contract.

1.19 CONNECTION TO EQUIPMENT FURNISHED BY OTHERS

- A. Each Contractor shall make all connections to equipment furnished by others, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.
- B. All drawings are complementary, one trade of the other. It is the Contractor's responsibility to examine all drawings and specifications to determine the full scope of his work. The project Engineers have arranged the specifications and drawings in their given order solely as a convenience in organizing the project, and in no way shall they imply the assignment of work to specific trades, contractors, subcontractors or suppliers.
- C. Supervision to assure proper installation, functioning and operation shall be provided by the Contractor furnishing the equipment or apparatus to be connected.
- D. Items indicated on the drawings as rough-in only (RIO) will be connected by the equipment supplier or Owner, as indicated. The Contractor shall be responsible for rough-in provisions only as indicated. These rough-ins shall be in accord with the manufacturer's or supplier's requirements.
- E. For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.

- F. The Contractor shall be responsible for coordinating with the General and all other trades, as necessary, to determine any and all final connections that he is to make to equipment furnished by others.
- 1.20 CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.
- A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, extensions, etc. in connection with his work.
- B. The Contractor shall file all necessary plans, utility easement requests and drawings, survey information on line locations, load calculations, etc. prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.
- C. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall be versed in all Codes, Rules and Regulations pertinent to the work prior to submission of a proposal.
- D. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.
- E. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.
- F. All materials and equipment shall bear the approval label of, or shall be listed by the Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable.
- G. Where minimum code requirements are exceeded in the Design, the Design shall govern.
- H. The Contractor shall ensure that the work is accomplished in accordance with the OSHA Standards and any other applicable government requirements.
- I. All work relating to the handicapped shall be in accord with regulations currently enforced by the Authority Having Jurisdiction.
- J. Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.
- 1.21 TEMPORARY SERVICES
- A. The Contractor shall arrange with the General Contractor or Construction Manager for temporary electrical and other services which he may require to accomplish his work. In the absence of other provisions in the contract, the Contractor shall provide for his own temporary services of all types, including the cost of connections, utility company fees, construction, removal, etc., in his bid.
- B. All temporary services shall be removed by Contractor prior to acceptance of work.
- 1.22 TEMPORARY USE OF EQUIPMENT
- A. The permanent electrical equipment, when installed, may be used for temporary services, subject to an agreement between the Contractors involved, the Owner, and with the consent of the Engineer. Should the permanent systems be used for this purpose, each Contractor shall pay for all temporary connections required and any replacements required due to damage without cost, leaving the equipment and installation in "as new" condition.
- B. Permission to use the permanent equipment does not relieve the Contractors who utilize this equipment from the responsibility for any damages to the building construction and/or equipment which might result because of its use.
- 1.23 PROTECTION OF MATERIALS AND EQUIPMENT
- A. The Contractor shall be entirely responsible for all material and equipment furnished in connection with the work and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer. All rough-in conduit shall be properly plugged or capped during construction in a manner approved by the Engineer.
- B. Equipment damaged, stolen or vandalized while stored on site, either before or after installation, shall be repaired or replaced (as determined by the Engineer) by the responsible Contractor. Electrical equipment exposed to the weather shall be replaced by the Contractor at the Contractor's expense.
- 1.24 EQUIPMENT SUPPORT
- A. Each piece of equipment, apparatus, or conduit suspended from the ceiling or mounted above the floor level shall be provided with suitable structural support, conduit rack, or platform in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and conduit. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc.

1.25 REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT

- A. The NEC has specific required clearances above, in front, and around electrical gear, panels etc.
- B. Contractor shall ensure that no piping, ductwork, etc., is installed in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated without additional cost to the Owner.

1.26 ACCESSIBILITY

- A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in partitions and above suspended ceilings for the proper installation of his work. He shall cooperate with the General Contractor (or Construction Manager) and all other Contractors whose work is in the same space, and shall advise each Contractor of his requirements. Such spaces and clearances shall be kept to the minimum size required to ensure adequate clearance and access.
- B. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to junction boxes, pull boxes, contactors, panels, disconnects, controllers, switchgear, etc. Minor deviations from drawings may be made to allow for better accessibility, and any change shall be approved where the equipment is concealed.
- C. Each Contractor shall provide (or arrange for the provision by other trades) the access panels for each concealed junction box, pull box, fixtures or electrical device requiring access or service as shown on Engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work. All access panels shall be installed in accord with the Architect's standards for such work.
- D. Access Doors; in Ceilings or Walls:
 - 1. In mechanical, electrical, or service spaces:
 - a. 14-gauge aluminum, 1" border, refer to architectural specifications for finishes
 - 2. In finished areas:
 - a. 14-gauge primed steel with 1" border to accept the architectural finishes specified for the space. Confirm these provisions with the Architect prior to obtaining materials or installing any such work.
 - 3. In fire or smoke rated partitions, access doors shall be provided that equal or exceed the required rating of the construction they are mounted in.
 - 4. All access doors shall have continuous hinge and screw type cover. Openings shall be sized to allow personal to pass through.
- E. Sides of cable trays cannot be obstructed by pipes, ductwork, cables, etc.

1.27 MAINTENANCE OF EXISTING UTILITIES AND LINES

- A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that come within the contract construction site, shall be subject to continuous uninterrupted maintenance with no exception unless the Owner of the utilities grants permission to interrupt same temporarily, if need be. Provide one week's written notice to Engineer, Architect and Owner prior to interrupting any utility service or line. Also, see Article 1. - General, this section.
- B. Known utilities and lines as available to the Engineer are shown on the drawings. However, it is additionally required that, prior to any excavation being performed, each Contractor ascertain and mark all utilities or lines that would be endangered by the excavation. Contractor shall bear costs of repairing damaged utilities.
- C. If the above-mentioned utilities or lines occur in the earth within the construction site, the Contractor shall first probe and make every effort to locate the lines prior to excavating in the respective area.
- D. Cutting into existing utilities and services shall be done in coordination with and as designated by the Owner of the utility. The Contractor shall work continuously to restore service(s) upon deliberate or accidental interruption, providing premium time and materials as needed without extra claim to the Owner.
- E. The Contractor shall repair to the satisfaction of the Engineer any surface or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.
- F. Machine excavation shall not be permitted within ten feet of existing gas or fuel lines. Hand excavate only in these areas, in accord with utility company, agency or other applicable laws, standards or regulations.
- G. Protect all new or existing lines from damage by traffic, etc. during construction.
- H. Protect existing trees, indicated to remain with fencing or other approved method. Hold all new subsurface lines outside the drip line of trees, offsetting as necessary to protect root structures. Refer to planting or landscaping plans, or in their absence, consult with the Architect.

1.28 RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, ETC.

- A. The Contractor shall replace to their original condition all paving, curbing surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item to be replaced. All repairs shall be to the satisfaction of the Engineer, and in accord with the Architect's standards for such work, as applicable. Patchwork on new construction will not be accepted.

1.29 CONCRETE WORK

- A. The Contractor shall be responsible for the provision of all concrete work required for the installation of any of his systems or equipment. If this work is provided by another trade, it will not relieve the Electrical Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Electrical work shall be 3000 PSI minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication ACI-318. Heavy equipment shall not be set on pads for at least seven days after pour.
- B. All concrete pads shall be complete with all pipe sleeves, embeds, anchor bolts, reinforcing steel, concrete, etc., as required. Pads larger than 18" in width shall be reinforced with minimum #4 round bars on 6" centers both ways. All reinforcing steel shall be per ASTM requirements, tied properly, lapped 18 bar diameters and supported appropriately up off form, slab or underlayment. Bars shall be approximately 3" above the bottom of the pad with a minimum 2" cover. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms properly adhered repairs shall be made. If structural integrity is violated, the concrete shall be replaced. All surfaces shall be rubbed to a smooth finish and chamfered edges.
- C. All pads and concrete lighting standard bases shall be crowned slightly in center to avoid water ponding beneath equipment.
- D. In general, concrete pads for small equipment shall extend 6" beyond the equipment's base dimensions. For large equipment with service access panels, extend pads 18" beyond base or overall dimensions to allow walking and servicing space at locations requiring service access.
- E. Exterior concrete pads shall be 4" minimum above grade and 4" below grade on a tamped 4" dense grade rock base unless otherwise noted or required by utility company. Surfaces of all foundations and bases shall have a smooth finish with three-quarter inch radius or chamfer on exposed edges, troweled or rubbed smooth. All exterior pads shall be crowned approximately 1/8" per foot, sloping from center for drainage.

1.30 FINAL CONNECTIONS TO EQUIPMENT

- A. The roughing-in and final connections to all electrically operated equipment furnished under this and all other sections of the contract documents or by others, shall be included in the Contract and shall consist of furnishing all labor and materials for connection and proper testing. The Contractor shall carefully coordinate with equipment suppliers, manufacturer's representatives, the vendor or other trades to provide complete electrical and dimensional interface to all such equipment (kitchen, hoods, mechanical equipment, panels, refrigeration equipment, etc.).

1.31 ELECTRICAL CONNECTIONS

- A. The Contractor shall furnish and install all power wiring and fusing complete from power source to motor or equipment junction box, including power wiring through starters. The Contractor shall install all starters not factory mounted on equipment. Unless otherwise noted, the supplier of equipment shall furnish starters with the equipment. Also, refer to Divisions 21, 22, and 23 of Specifications, shop drawings and equipment schedules for additional information.
- B. All control, interlock, sensor, thermocouple and other wiring required for equipment operation shall be provided by the Contractor. All such installations shall be fully compliant with all requirements of Division 26 regardless of which trade actually installs such wiring. Motors and equipment shall be provided for current and voltage characteristics as indicated or required. All wiring shall be enclosed in raceways unless otherwise noted.
- C. Each Contractor or sub-contractor, prior to bidding the work, shall coordinate power, control, sensor, interlock and all other wiring requirements for equipment or motors with all other contractors or sub-contractors, to ensure all needed wiring is provided in the Contract. Failure to make such coordination shall not be justification for claims of extra cost or a time extension to the Contract.

1.32 MOTORS

- A. Each motor shall be provided by the equipment supplier or manufacturer with conduit terminal box, adequate starting and internal thermal overload protective equipment as specified or required. The capacity shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower as applicable. Also, see mechanical specification for further requirements and scheduled sizes.

1.33 QUIET OPERATION, SUPPORTS, VIBRATION AND OSCILLATION

- A. All work shall operate under all conditions of load without any objectionable sound or vibration, the performance of which shall be determined by the Engineer. Noise from moving machinery or vibration noticeable outside of room in which it is installed, or annoyingly noticeable noise or vibration inside such room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor (or Contractors responsible) at his expense.
- B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc., by means of flexible connectors, vibration absorbers or other approved means. Surface mounted equipment such as panels, switches, etc., shall be affixed tightly to their mounting surface.

- C. The Contractor shall provide supports for all equipment furnished by him using an approved vibration isolating type as needed. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. No work shall depend on the supports or work of unrelated trades unless specifically authorized in writing by the Architect or Engineer.

1.34 CUTTING AND PATCHING

- A. Unless otherwise indicated or specified, each Contractor shall provide his own cutting and patching necessary to install the work specified in this Division. Patching shall match adjacent surfaces to the satisfaction of the Engineer and shall be in accord with the Architect's standards for such work, as applicable.
- B. Each Electrical Contractor shall be responsible for all openings, sleeves, trenches, etc. that he may require in floors, roofs, ceilings, walls, etc. and shall coordinate all such work with the General Contractor and all other trades. He shall coordinate with the General Contractor any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the responsible Contractor.
- C. Each Electrical Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for conduit, conductors, wireways, etc. to go through; however, when this is not done, this Contractor shall do all cutting and patching as well as reinforcement required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Engineer. Any damage caused to the buildings by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.
- D. Each Electrical Contractor shall cut holes in casework, equipment panels, etc. (if any), as required to pass pipes in and out.
- E. Each Electrical Contractor shall notify other trades in due time where he will require openings of chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.
- F. Openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.
- G. No structural members shall be cut without the approval of the Structural Engineer and all such cutting shall be done in a manner directed by him.
- H. Each Electrical Contractor shall be responsible for properly shoring, bracing, supporting, etc. any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Engineer.
- I. All work improperly done or not done at all as required by the Electrical trades in this section will be performed by the General Contractor at the direction of the Contractor whose work is affected. The cost of this work shall be paid for by the Contractor responsible

1.35 SLEEVES AND PLATES

- A. Each Contractor shall provide and locate all sleeves and inserts required for his work before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where sleeves and inserts were not installed, or where incorrectly located. Each Contractor shall do all drilling required for the installation of his hangers. Drilling of anchor holes may be prohibited in post-tensioned concrete construction, in which case the Contractor shall request approved methods from the Architect and shall carefully coordinate setting of inserts, etc., with the Structural Engineer and/or Architect.
- B. Galvanized steel sleeves shall be provided for all electrical conduit passing thru concrete floor slabs and concrete, masonry, tile and gypsum wall construction.
- C. Cast iron sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking with lead and oakum between pipe and sleeve for waterproofing.
- D. In all cases, sleeves shall be at least two pipe sizes larger than nominal pipe diameter.
- E. Where conduit motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:
 1. Terminate sleeves flush with walls, partitions and ceiling.
 2. In areas where pipes are concealed, as in chases, terminate sleeves flush with floor.
 3. In all areas where pipes are exposed, extend sleeves ½ inch above finished floor, except in rooms having floor drains, where sleeves shall be extended ¾ inches above floor.
- F. Sleeves shall be constructed of 24-gauge galvanized sheet steel with lock seam joints for all sleeves set in concrete floor slabs terminating flush with the floor. All other sleeves shall be constructed of galvanized steel pipe unless otherwise indicated on the drawings.
- G. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction occurs around them. Take precautions to prevent concrete, plaster or other materials being forced into the

space between pipe and sleeve during construction. Fire and smoke stop all sleeves in a manner approved by the local authority having jurisdiction or per prevailing codes.

H. Sleeves passing through exterior wall (none are permitted thru roof) or where there is a possibility of water leakage and damage shall be caulked water tight for horizontal sleeves and flashed and counter-flashed with lead (4 lb.) or copper and soldered to the piping, lapped over sleeve and properly weather sealed. All roof penetrations shall be made inside mechanical equipment curbs.

I. All rectangular or special shaped openings in plaster, stucco or similar materials including gypsum board shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirements is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for lighting fixtures, panels, etc. Lintels shall be provided where indicated over all openings in bearing walls, etc.

1.36 WEATHERPROOFING

A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect and/or Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

B. Wherever work penetrates roofing, it shall be done in a manner that will not diminish or void the roofing guarantee or warranty in any way. Coordinate all such work with the roofing installer.

1.37 SMOKE AND FIRE PROOFING

A. The Contractor shall not penetrate rated fire walls, ceilings or floors with conduit, cable, bus duct, wireway or other raceway system unless all penetrations are protected in a code compliant manner which maintains the rating of the assembly. Smoke and fire stop all openings made in walls, chases, ceiling and floors. Patch all openings around conduit, wireway, bus duct, etc., with appropriate type material to smoke stop walls and provide needed fire rating at fire walls, ceilings and floors. Smoke and fire proofing materials and method of application shall be approved by the local authority having jurisdiction. Submit means to be used.

1.38 WELDING

A. The Contractor shall be responsible for quality of welding done by his organization and shall repair or replace any work not done in accordance with the Architect's or structural Engineer's specifications for such work. If required by the Engineer, the responsible Contractor shall cut at least three welds during the job for X-raying and testing. These welds are to be selected at random and shall be tested as a part of the responsible Contractor's work. Certification of these tests and X-rays shall be submitted, in triplicate, to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests and corrective measures until satisfactory results are obtained. All welding to be accomplished by certified welder.

1.39 SCAFFOLDING, RIGGING AND HOISTING

A. Each Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required in strict accordance with OSHA Guidelines.

1.40 INSPECTION, APPROVALS AND TESTS

A. Before requesting a final review of the installation from the Architect and/or Engineer, each Contractor shall thoroughly inspect his installation to assure that the work is complete in every detail and that all requirements of the Contract Documents have been fulfilled. Failure to accomplish this may result in charges from the Architect and/or Engineers for unnecessary and undue work on their part.

B. Owner's and Engineer's inspections: Two inspections will be held to generate and then review punchlist items. All site visits thereafter shall be billed to the Contractor at the Engineer's standard hourly rates.

C. The Contractor shall provide as a part of this contract electrical inspection an inspector, licensed to provide such services. All costs incidental to the provision of electrical inspections shall be borne by the Contractor.

D. The Contractor shall advise each Inspection Agency in writing (with an information copy of the correspondence to the Architect and/or Engineer) when he anticipates commencing work. Failure of the Inspection Agency to inspect the work in the stage following and submit the related reports may result in the Contractor's having to expose concealed work not so inspected. Such exposure will be at the expense of the responsible Contractor.

E. Inspections shall be scheduled for rough-in as well as finished work. The rough-in inspections shall be divided into as many inspections as may be necessary to cover all roughing-in without fail. Report of each such inspection visit shall be submitted to the Architect, Engineer and the Contractor within three days of the inspection.

F. Approval by an Inspector does not relieve the Contractor from the responsibilities of furnishing equipment having a quality of performance equivalent to the requirements set forth in these plans and specifications. All work under this contract is subject to the review of the Architect and/or Engineer, whose decision is binding.

G. Before final acceptance, the Contractor shall furnish the original and three copies of the certificates of final approval by the Electrical Inspector (as well as all other inspection certificates) to the Engineer with one copy of each to the appropriate government agencies, as applicable. Final payment for the work shall be contingent upon completion of this requirement.

- H. The Contractor shall test all wiring and connections for continuity and grounds before equipment and fixtures are connected, and when indicated or required, demonstrate by Megger Test the insulation resistance of any circuit or group of circuits. Where such tests indicate the possibility of faulty insulation, locate the point of such fault, pull out the defective conductor, replacing same with new and demonstrate by further test the elimination of such defect.

1.41 OPERATING INSTRUCTIONS

- A. Upon completion of all work and all tests, each Contractor shall furnish the necessary skilled labor and helpers for operating his systems and equipment for a period of three days of eight hours each, or as otherwise specified. During this period, instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished. Give at least one week's written notice to the Owner, Architect and Engineer in advance of this period. Contractor shall prepare an agenda for approval by Owner. The Engineer may attend any such training sessions or operational demonstrations. The Contractor shall certify in writing to the Engineer with copy to the Owner and Architect that such demonstrations have taken place, noting the date, time and names of the Owner's representative that were present.
- B. Each Contractor shall furnish three complete bound sets for approval to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Each section shall be properly tabbed, indexed and labeled, with a table of contents. Minimum 3-ring hard cover binder. Include specific part, catalog, model, serial, and shop order numbers; statement of warranties – indexed by section; manufacturer names, P.O.C. for warranties, etc.
- C. Each Contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this contract and a detailed, easy to read parts list and the name and address of the nearest source of supply.

1.42 CLEANING

- A. Contractor shall, at all times, keep the area of their work presentable to the public and clean of rubbish and debris caused by operations; and at the completion of the work, shall remove all rubbish, debris, all of his tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use.
- B. If the Contractor does not attend to cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor.
- C. Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of the Contractor's rubbish or debris.
- D. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of equipment, fixtures and all other associated or adjacent fabrication.

1.43 PAINTING

- A. Each fixture, device, panel, junction box, etc., that is located in a finished area shall be provided with finish of color and type as selected or approved by the Architect or Engineer. If custom color is required by the plans or specifications, it shall be provided at no additional cost to the Owner. All other equipment, fixtures or devices located in finished or unfinished areas, that are not required to have or are provided with finish color or coating shall be provided in a prime painted condition, ready to receive finish paint or coating. All galvanized metal in finished areas and exposed on exterior shall be properly prepared with special processes to receive finish paint as directed and approved by the Architect.

1.44 INDEMNIFICATION

- A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

1.45 HAZARDOUS MATERIALS

- A. Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, insure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall insure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.
- B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

- C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.
- D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 26 00 00

SECTION 26 05 03 – ELECTRICAL SHOP DRAWINGS AND SUBMITTALS

PART 1 - GENERAL

1.01 SHOP DRAWINGS

- A. Each Contractor shall submit to the Architect and/or Engineer, within thirty days after the date of the Contract, sets of shop drawings and/or manufacturer's descriptive literature (coordinate exact quantity with architectural specifications) on all equipment required for the fulfillment of his contract. Each shop drawing and/or manufacturer's descriptive literature shall have proper notation indicated on it and shall be clearly referenced so the specifications, schedules, light fixture numbers, panel names and numbers, etc., so that the Architect and/or Engineer may readily determine the particular item the Contractor proposes to furnish. All data and information scheduled, noted or specified by hand shall be noted in color red on the submittals. The Contractor shall make any corrections or changes required and shall resubmit for final review as requested. Review of such drawings, descriptive literature and/or schedules shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless they have, in writing, directed the reviewer's attention to such deviations at the time of submission of drawings, literature and manuals; nor shall it relieve them from responsibility for errors or omissions of any nature in shop drawings, literature and manuals. The term "as specified" will not be accepted.
- B. If the Contractor fails to comply with the requirements set forth above, the Architect and/or Engineer shall have the option of selecting any or all items listed in the specifications or on the drawings, and the Contractor will be required to provide all materials in accordance with this list.
- C. Review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the installing Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.
- D. The Engineer's review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for the adaptability of the equipment or materials to the project, compliance with applicable codes, rules, regulations, information that pertains to fabrication and installation, dimensions and quantities, electrical characteristics, and coordination of the work with all other trades involved in this project.
- E. No cutting, fitting, rough-in, connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractors concerned. It shall be each Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. Each Contractor shall coordinate with all the other Contractors having any connections, roughing-in, etc., to the equipment, to make certain proper fit, space coordination, voltage and phase relationships are accomplished.
- F. In accord with the provisions specified hereinbefore, shop drawings, descriptive literature and schedules shall be submitted on each of the following indicated items as well as any equipment or systems deemed necessary by the Engineer:
 1. Power Equipment:
 - a. Panelboards.
 - b. Transformers.
 - c. Circuit breakers or fusible switches, per each type.
 - d. Power and lighting contactors.
 - e. Disconnect switches.
 - f. Fuses, per each type required.
 - g. Magnetic starters, if not submitted with unit equipment by supplier.
 - h. Control components (relays, timers, selector switches, pilots, etc.)
 2. Raceways:
 - a. Conduit (each type).
 - b. Wireways and each type of wireway fitting.
 - c. Surface raceways and fittings.
 - d. Junction, pull, and device boxes
 3. Devices:
 - a. Building wire, cable splices, and terminations
 - b. Each type of wiring device and their coverplates.
 - c. Any special items not listed above.
 4. Lighting:
 - a. Light fixtures, each by type, marked to indicate all required accessories and lamp selection. Also, provide original color selection chart to allow Architect and/or Engineer to indicate color selection.
 - b. Lamps, each by type.
 - c. Lighting standards or poles.

- d. Photocells, time clocks or other lighting control devices and accessories.
- e. Control systems (lighting).
- 5. Miscellaneous
 - a. Control panel assemblies.
 - b. Non-standard junction/pullboxes
- G. Specification Compliance Certification: Where this Section and other Sections of this Division require Specification Compliance Certification to be submitted, comply with the following:
 - 1. Prepare a line-by-line Specification Compliance Certification by marking up a copy of the Contract Document specification section in the left margin. Accompany the markup with a written report explaining all items that are not marked with "Compliance". Submit line-by-line markup, written report of deviations and alternates and a cover letter certified by Manufacturer or Installer that prepared the Specification Compliance Certification. Use the following key for preparing the line-by-line markup.
 - a. "C" for Compliance: By noting the term "compliance" or "C" in the margin, it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
 - b. "D" for Deviation: By noting the term "deviation" or "D" in the margin, it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified.
 - c. "A" for Alternate: By noting the term "alternate" or "A" in the margin, it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner.
 - d. "N/A" for Not Applicable: By noting the term "not applicable" or "N/A" in the margin, it shall be understood that the specified item is not applicable to the project.
- 1.02 SPECIAL WRENCHES, TOOLS AND KEYS
 - A. Each Contractor shall provide, along with the equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed by him. Wrenches shall include necessary keys, handles and operators for valves, switches, breakers, etc. and keys to electrical panels, alarm pull boxes and panels, etc. At least two of any such special wrench, keys, etc. shall be turned over to the Architect prior to completion of the project. Obtain a receipt that this has been accomplished and forward a copy to the Engineer.
- 1.03 MAINTENANCE AND OPERATION MANUALS
 - A. Upon substantial completion of the project, the Electrical Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three complete copies of operation and maintenance instructions and parts lists for all equipment provided. These documents shall at least include:
 - 1. Detailed operating instructions.
 - 2. Detailed maintenance instructions including preventive maintenance schedules.
 - 3. Addresses and phone numbers indicating where parts may be purchased.
 - 4. Reference architectural specifications for additional requirements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 26 05 03

SECTION 26 05 10 - SCOPE OF THE ELECTRICAL WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Each Electrical Contractor's attention is directed to Section 26 00 00 "Common Electrical Requirements" and all other Contract Documents as they apply to his work.

1.02 SCOPE

- A. The Electrical work for this project includes all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, place in service and deliver to the Owner complete electrical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not limited to the following:
 - 1. All conduits, cable tray, conductors, outlet boxes, fittings, etc.
 - 2. All panelboards, disconnect switches, fuses, transformers, contactors, etc.
 - 3. All wiring devices and device plates.
 - 4. All light fixtures and lamps.
- B. Electrical connection to all electrically operated equipment furnished and/or installed by others, including sports lighting equipment, mechanical equipment, foodservice equipment, etc.
- C. Inspection of electrical system by an approved Electrical Inspector, in compliance with local requirements.
- D. Grounding, per NEC and the specified requirements.
- E. All necessary coordination with electric utility company, telephone company, cable T.V. Co., etc., to ensure that work, connections, etc., that they are to provide is accomplished.
- F. All necessary fees and cost for permits, inspections, etc. Provision of electrical power, telephone and cable television services into the building from the utility termination points outside.
- G. Rough-in for data/voice structured cabling network as indicated.
- H. Rough-in for intercommunications and program (paging-intercom) system as indicated.
- I. Rough-in for video surveillance system as indicated.
- J. Rough-in for intrusion detection system as indicated.
- K. Rough-in for access control system as indicated.
- L. Rough-in for fire alarm system.
- M. Special Note: A specialty sub-contractor(s) (Electronic Systems Contractor) shall be utilized for all paging-intercom system, data/voice network, fire alarm work, sound systems, video surveillance system, intrusion detection system and for the security access control system installation. The sub-contractor shall be especially skilled in such work and shall be able to demonstrate that their regular business involves such installations. The specialty sub-contractor(s) shall be acceptable to and approved by the Owner. The names of each such sub-contractor shall be listed on the form of proposal at the time of opening bids. Provisions for branch circuits, pulling of cabling, and installation of raceways for specialty systems may be regular sub-contractor if approved by specialty contractor. All terminations, connections, check-out and testing shall be by specialty contractor.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 26 05 10

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 1. Building wires and cables rated 600 V and less.
 2. Variable frequency drive cable, rated 600 V and less.
 3. Metal-clad cable, Type MC, rated 600 V and less.
 4. Connectors, splices, and terminations rated 600 V and less.
 5. Sleeves and sleeve seals for cables.

1.02 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.
- C. VFD: Variable frequency drive.

1.03 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For each type of product indicated. Provide data for conductors and cables including, but not be limited to, the following:
 1. Complete physical properties of the conductors and cables.
 2. Ampacity for use intended.
 3. Allowable stresses and requirements for installations, including bend radii, linear stress, and other pertinent data.
 4. Types of connectors for terminations.

1.04 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For conductors and cables, to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
 1. Manufacturer's routine maintenance requirements for cables, terminations and all installed components.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.07 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.01 BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V and less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Alpha Wire.
 2. Belden Inc.
 3. Encore Wire Corporation.
 4. General Cable Corporation.
 5. Southwire Company.
- C. Standards:
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 2. RoHS compliant.
 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Copper Conductors: Comply with NEMA WC 70. All conductors shall be 98% conductive annealed copper unless noted otherwise. Comply with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
 1. Type THHN and Type THWN-2: Comply with UL 83.
 2. Types THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

3. Type XHHW-2: Comply with UL 44.
- 2.02 VARIABLE FREQUENCY DRIVE (VFD) CABLE
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AmerCable.
 2. General Cable Corporation.
- B. Standards:
1. Comply with UL 1277 Type TC-ER per NEC Article 336.
 2. Comply with UL 1685 vertical tray flame test.
 3. Comply with IEEE 1202 vertical tray flame test at 70,000 BTU/hour.
 4. Comply with CSA FT4.
 5. Comply with Oil & Sunlight resistant.
 6. RoHS compliant and CE approved.
- C. Cable (minimum requirements):
1. 600V/1000V rated, high stranded tinned copper conductors, shielded engineered for use with Variable Frequency Drives.
 2. Insulation shall be rated for 90 deg C wet/dry operating temperature.
 3. Suitable for Class I and II; Division 2 hazardous locations.
- D. Conductor Material:
1. Stranded tinned copper: Annealed fine wire flexible high strand count.
 2. Three (3) phase conductors, three (3) ground conductors. Each of the three ground conductors shall be the same size as the single ground conductor shown on the Drawings.
- E. Insulation:
1. Flame-Retardant Cross-Lined Polyolefin.
 2. Conductors shall be cabled together. Ground conductors shall be symmetrical. Fillers shall be included as necessary to make the cable round.
- F. Shielding: Overall tinned copper braid plus aluminum/polyester tape foil, 100% coverage.
- G. Jacket: Flame-retardant Thermoplastic, suitable for 90 deg C use.
- H. Termination Kit: Pre-sized and pre-formed specifically for VFD cable constructions. Obtain from VFD cable manufacturer.
- 2.03 MULTICONDUCTOR CABLES
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Belden Inc.
 2. Encore Wire Corporation.
 3. General Cable Corporation.
 4. Southwire Company.
- B. Metal-Clad Cable, Type MC: A factory assembly of insulated current-carrying conductors with an equipment grounding conductor in an overall metallic sheath.
1. Standards:
 - a. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - b. Comply with UL 1569.
 - c. Listed for use in Environmental Air space according to NPFA 70 Article 300.
 - d. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
 2. Circuits:
 - a. Single circuit.
 - b. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.
 3. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
 4. Ground Conductor: Insulated.
 5. Conductor Insulation: Type TFN/THHN/THWN-2: Comply with UL 83.
 6. Armor: Steel, interlocked.
- 2.04 CONNECTORS AND SPLICES
- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AFC Cable Systems, Inc.
 2. Hubbell Power Systems, Inc.
 3. O-Z/Gedney; EGS Electrical Group LLC.
 4. 3M; Electrical Products Division.

- 5. Thomas & Betts (T&B).
 - 6. Tyco Electronics Corp.
 - B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
 - C. Splicing devices for use on No. 14 to No. 10 AWG conductors shall be pressure type such as T & B "STA-KON", Burndy, Reliable or approved equivalent.
 - D. Wire nuts shall be spring pressure type, insulation 600V, 105 deg. C insulation, up to #8 size. Greater than #6 Cu shall be a compression type connection, 600V insulation, cold shrink tubing, taped, for full insulation value.
 - E. Pressure crimp-applied ring type (or fork with upturned ends) terminations shall be employed on motor and equipment terminals where such terminals are provided on motor and equipment leads or on all stranded wire terminations using #10 AWG or smaller conductors.
 - F. Splices, where necessary, shall be made with hydraulically-set "Hy-press" or equivalent crimped connectors. All splices shall be insulated to the full value of the wiring insulation using a cold-shrink kit or the equivalent in built-up materials.
 - G. Large connectors (lugs) shall be compression, hydraulically set. Lugs furnished on equipment shall be per manufacturer's recommendations.
 - H. Underground connections made between bare ground wires or to ground rods shall be exothermically welded, "Cadweld" or equivalent.
 - I. No aluminum splicing devices or connectors shall be used.
- 2.05 MISCELLANEOUS PRODUCTS
- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength: 50 lb, minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F.
 - 4. Color: Black, except where used for color-coding. Refer to Division 26 Section "Identification for Electrical Systems" for color-coding requirements.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Stranded for all wire.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. VFD Output Circuits Cable: Extra-flexible stranded for all sizes.
- D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.
- E. Provide conductors with minimum temperature ratings of 75 degrees C. For high temperature applications, provide conductors with temperature ratings in accordance with the NFPA 70 for the ambient condition.
- F. Conductors used for motor connections and connections to vibrating or oscillating equipment shall be extra flexible stranded.
- G. All conductors shall be new, in good condition, and delivered in standard coils and reels.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
- C. Feeders below Slabs-on-Grade and Underground:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspace:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Concrete, below Slabs-On-Grade, and Underground:
 - 1. Copper: Type THHN-THWN, single conductors in raceway.
 - 2. Branch circuits shall not be routed below Slabs-On-Grade unless approved by the Engineer.
- G. Connections to Luminaires: Metal-Clad Cable, Type MC, maximum of 72 inches.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. VFD Output Circuits: Type TC-ER (XLPE) cable with braided shield.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Power-limited tray cable, in cable tray.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Run feeders in continuous lengths, without joints or splices. Where continuous runs are impractical; obtain Engineer's approval for splice locations and application.
- B. Branch wiring and feeder conductors that are greater than 50-feet in length shall be increased at least one size to compensate for voltage drop. All circuits shall be installed and sized for a maximum 2% voltage drop as calculated using 80% of the supply breaker rating as the load. Adjust conductors and conduit size accordingly for actual field installed conditions.
- C. Make joints in branch circuits only where circuits divide.
- D. Do not use gutters of panelboards as raceways, junction boxes, or pull boxes for conductors not terminating in said panelboards.
- E. Run conduits for emergency power conductors separate from all other wiring.
- F. Make splices and terminations in cables with kits and instructions provided by the kit manufacturer. Each splice shall equal the integrity of the cable electrically and environmentally.
- G. Bundling Conductors: Bundle conductors in switchboards, panelboards, cabinets, and the like, using nylon ties made for the purpose. Bundle conductors larger than No. 10 in individual circuits. Smaller conductors may be bundled in larger groups.
- H. Install all conductors in raceways, unless otherwise indicated.
- I. Sizes:
 - 1. Provide conductors no smaller than No. 12 AWG, except for signal or control circuits.
 - 2. Provide No. 10 AWG conductors for home runs on 120-volt, 20-ampere branch circuits, where the conductor length exceeds 100 lineal feet from panelboard to the first device.
 - 3. Provide No. 10 AWG conductors for home runs on 277-volt, 20-ampere branch circuits, where the conductor length exceeds 200 lineal feet from panelboard to the first device.
 - 4. Provide neutral conductors of the same size as the phase conductor(s) for individual branch circuit homeruns.
 - 5. Run dedicated neutral conductor with each branch circuit. Sharing of neutral conductors in multi-circuit homeruns is not acceptable.
 - a. Sharing of neutrals would necessitate the use of multiple-pole or tied branch circuit breakers to allow simultaneous disconnecting of current carrying conductors in order to comply with NFPA 70 requirements and therefore is unacceptable.
 - 6. Grouping of Multi-Circuit Homeruns: Grouping of multiple circuits into shared conduit homeruns is acceptable where they comply with the quantities and sizes listed in Table "A" below and where homeruns meet the following conditions:
 - a. Where conductors are THWN/THHN installed in dry location.
 - b. Where raceways are installed in ambient conditions less than 30-Deg C (86-Deg F).
 - c. Consider neutral conductors as a current carrying conductor in branch circuits which serve receptacles or electronic ballasted luminaries.
 - d. No more than seven conductors shall be installed in conduit except for switch legs and travelers in multi-point switching arrangements.

TABLE A

Number of Current Carrying Conductors in single raceway	Conductor Size for 20Ampere Single Pole Circuit	Conduit Size based on EMT
2 to 3	#12 AWG (THHN 75-Deg) or #12 AWG (THHN 90-Deg)	3/4" EMT
4 to 6	#12 AWG (THHN 75-Deg) or #12 AWG (THHN 90-Deg)	3/4" EMT
7 to 9	#10 AWG (THHN 75-Deg) or #12 AWG (THHN 90-Deg)	1" EMT 3/4" EMT

Notes:

- 1. Conductor and conduit sizes in table above are based on total conductor lengths under 100 lineal feet for 120-volt (200 lineal feet for 277-volt) from panelboard to the first device, 20-ampere branch circuits. Increase conductor and conduit size in accordance with NFPA 70 for longer lengths.
- J. Terminations of multiple branch circuit conductors on a single circuit breaker is not acceptable.
- K. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- L. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible. Cables that are installed exposed shall not be routed across ceilings or ductwork. They shall be held up against building structure or against permanent support members. They shall be installed in such a manner that they do not interfere with the operation of equipment or removal of ceiling tiles. Nylon tie-wraps shall be installed in such a manner so as to bundle conductors neatly, allowing runouts of single conductors or groups to drop down to equipment served. Install

grommets where dropping out of trays or into panels or service columns. Install sleeves with bushings where penetrating partitions. Firestop sleeves with approved material. Do not penetrate firewalls if so indicated on plans.

- M. Intentional or unintentional painting of exposed low voltage or line voltage cabling is prohibited. Ensure that exposed cabling is adequately protected from direct painting or overspray whether painting is required within the electrical specifications or required by other disciplines/trades. Review the painting requirements for all disciplines and provide cabling protection as required. Where exposed cabling is being installed in exposed ceilings or wall spaces that are required to be painted, provide alternate options for cable colors and submittals for such cabling for Engineer to review.

- N. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

3.04 WIRE PULLING

- A. Pull no conductors into conduits until all Work of a nature which may cause injury to conductors is completed.
- B. Follow manufacturers' recommendations for regulating temperature conditions of conductors prior to installation.
- C. Exercise care in handling and installing cables to avoid damage. Carefully form cables in equipment pull boxes. Form bends in cables larger than the minimum radii shown in the cable manufacturer's published data for minimum bends such that bends will not reduce the cable life.
 1. The radius of bending of conductors shall be not less than eighteen (18) times the outside diameter of the conductor insulation.
- D. Provide suitable installation equipment to prevent abrasion and cutting of conductors by raceways during the pulling of conductors. Use ropes of polyethylene, nylon or other suitable non-metallic material to pull in feeders. Metallic ropes are prohibited.
- E. Attach pulling lines to conductors by means of insulated woven basket grips or by pulling eyes attached directly to conductors. Do not use rope hitches, or bare steel basket grips. All conductors to be installed in a single conduit shall be pulled in simultaneously.
- F. The pulling of all wires and cable on this project shall be performed in strict compliance with applicable sections of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation. Conductors shall only be installed after insulating bushings are in place.
- G. Maximum permissible pulling tensions, as recommended by the manufacturer for any given type of cable or wire installed shall not be exceeded. Utilize special remote readout equipment to ensure compliance.
- H. Before any wire is pulled into any conduit, thoroughly swab the conduit to remove all foreign material and to permit the wire itself to be pulled into a clean, dry conduit.
- I. Use manufacturer-approved pulling compound or lubricant where necessary, of non-conducting type. Compounds used must not deteriorate the conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

3.05 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.06 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
- D. Wiring at Lighting Control Locations: Install a neutral conductor at each switch location controlling line-to-neutral lighting loads.
- E. Connectors: Make splices and connections in conductors using approved connectors.
 1. Provide lugs and connectors of proper size to match conductor size.
 2. Stranded Conductors: Solder-less, bolted pressure or compression connectors.
 3. Solid Conductors: Bolted pressure or spring connectors.
 4. Motor Lead Pigtails: Crimp lugs with through-bolt fasteners between lugs. Furnish proper sized dies and tools to apply connectors.
 5. Lighting Fixture Taps: Electrical spring connectors as specified for solid conductors.
 6. Ground Connections: Ground connection materials and installation requirements are specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
 7. Wire Nuts:
 - a. For up to #8 AWG in size, use spring pressure type, insulation 600V, 105 deg C insulation
 - b. For greater than #8 AWG in size, use compression type connection, 600V insulation, cold shrink tubing, taped, for full insulation value.
- F. Provide temperature ratings of connectors and splices to match wire rating.

3.07 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Firestopping."

3.08 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:

1. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 1000 volts dc for one minute.
2. Perform continuity test to insure correct cable connection.
3. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors of No. 2 AWG and larger for compliance with requirements.
4. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
5. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - b. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

- B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

- C. Cables will be considered defective if they do not pass tests and inspections. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. NFPA 70 and IEEE C2 include basic grounding requirements for electrical safety. This Section supplements the minimum safety requirements of the Code with requirements for additional grounding and with optional grounding methods and materials for both power and electronic systems.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.
- C. Related Sections include the following:
 - 1. Division 27 Section "Grounding and Bonding for Communications Systems".

1.02 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For each type of product indicated.

1.03 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Grounding arrangements and connections for separately derived systems.
 - 4. Grounding for sensitive electronic equipment.
- B. Field quality-control test reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems and test wells, based on NETA MTS.
 - a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - b. Include recommended testing intervals.

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.
- C. Comply with NFPA 70.
- D. Comply with IEEE C2.
- E. Comply with ANSI-J-STD-607-A.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Burndy; Part of Hubbell Electrical Systems.
 - 2. Dossert; AFL Telecommunications LLC.
 - 3. ERICO International Corporation.
 - 4. Fushi Copperweld Inc.
 - 5. Galvan Industries, Inc.; Electrical Products Division, LLC.
 - 6. Harger Lightning and Grounding.
 - 7. ILSCO.
 - 8. O-Z/Gedney; an EGS Electrical Group brand; an Emerson Industrial Automation business.
 - 9. Robbins Lightning, Inc.
 - 10. Siemens Power Transmission & Distribution, Inc.

2.02 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

- B. Bare Copper Conductors:
 1. Solid Conductors: ASTM B 3.
 2. Stranded Conductors: ASTM B 8.
 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
 6. Main Bonding Jumper: Stranded copper conductors sized as indicated on Drawings.
 7. Grounding Electrode Conductor: Stranded copper conductors sized as indicated on Drawings.
 8. Common Grounding Electrode Conductor: Stranded copper conductors sized as indicated on Drawings.
 - C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.
- 2.03 CONNECTORS
- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
 - B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.
 - C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
 - D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- 2.04 GROUNDING ELECTRODES
- A. Ground Rods: Copper-clad steel; 5/8-inch diameter by 96 inches long.

PART 3 - EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install insulated solid conductor for No. 8 AWG and smaller and insulated stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 1. Install bus on insulated spacers 2 inches minimum from wall, 12 inches above finished floor unless otherwise indicated.
- C. Conductor Terminations and Connections:
 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 4. Connections to Structural Steel: Welded connectors.

3.02 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.03 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Dry-Type Transformers: Install an insulated grounding conductor from the common point of connection of the transformer secondary neutral point and the transformer enclosure to the following:
 1. The nearest grounding electrode per NFPA 70, including but not limited to building steel where available.
 2. The grounding bus of the common electrode grounding system, located in the electrical equipment room.

3.04 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
 1. Bond to each device, box, and luminaire, unless otherwise indicated.
 2. Conductor insulation of the same rating as the phase conductors, for all feeders and branch circuits. Install the grounding conductors in the raceway with related phase and neutral conductors.
 3. Where parallel conductors in separate raceways occur, provide a grounding conductor in each raceway that meets requirements of NFPA 70.
- B. Enclosures: Install an insulated grounding conductor from grounding bushings to the frame of the enclosure, ground bus, and equipment grounding strap where each occurs. Install grounding bushings on all raceways connecting electrical enclosures constructed of separate enclosure panels, which are not integrally welded together.

- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.
 - 3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.05 INSTALLATION

- A. All circuits shall have a separate grounding conductor.
- B. Provide permanent service neutral and equipment grounding in accordance with NFPA 70 and subject to the following additional requirements.
- C. Comply with mounting and support requirements specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- D. Connect the service neutral and equipment ground to a common point within the metallic enclosure containing the main service disconnecting means. Equipment grounds and the identified neutral of the wiring system shall not be interconnected beyond this point in the interior wiring system. From the common point of connection of the service neutral and the equipment ground, run in non-magnetic conduit a grounding electrode conductor without joint or splice to the grounding electrode system and connect it with an approved bolted pressure clamp.
- E. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- F. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- G. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
 - 4. Where expansion joints or telescoping joints occur, provide bonding jumpers.
- H. Grounding and Bonding for Piping:
 - 1. Metal Water Service Pipe: Install bare copper grounding conductors from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- I. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
 - 1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.
 - 2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

3.06 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."
- 3.07 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 - C. Grounding system will be considered defective if it does not pass tests and inspections.
 - D. Prepare test and inspection reports.
 - E. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 1000 kVA and Less: 5 ohms.
 - 2. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - 3. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm.
 - 4. Substations and Pad-Mounted Equipment: 5 ohms.
 - F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.02 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. RMC: Rigid metal conduit.
- E. RNC: Rigid nonmetallic conduit.
- F. RSC: Rigid steel conduit.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.04 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- C. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.
 - 3. Nonmetallic slotted channel systems. Include Product Data for components.
 - 4. Equipment supports.
 - 5. Concrete bases for equipment.

1.05 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- E. Device Box Mounting Brackets and Stabilizer: Factory-fabricated sheet steel brackets for support of device boxes adjacent to or between studs.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper B-Line, Inc.
 - b. ERICO International Corporation.
- F. Through-Stud Cable and Raceway Support Clips: Factory-fabricated spring steel clip for cables or raceways where run horizontally through metal studs.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper B-Line, Inc.
 - b. ERICO International Corporation.
- G. Roof-mounted Raceway Support Blocking: Factory-fabricated support blocking for use under roof-mounted raceways. Wedge-shaped blocking constructed of 100% recycled UV-resistant Rubber with integral galvanized steel strut to accept raceway support clips.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Cooper B-Line C-Port series components or a comparable product by one of the following:
 - a. Cooper B-Line, Inc.
 - b. ERICO International Corporation.
- H. Tee Bar Grid Box Hanger: Factory-fabricated metal electrical box hanger for supporting boxes at locations between ceiling system t-grid components. Height adjustable for various electrical box depths. Attached to ceiling tee bar with screws or integral clamp for stability. Includes tab for independent support wire attachment.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper B-Line, Inc.
 - b. ERICO International Corporation.
- I. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- J. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - 5. Toggle Bolts: All-steel springhead type.
 - 6. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.01 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. All electrical raceways shall be hung independently from the building structure with UL Listed and approved materials. Hangers and supports suspending from the support systems of other trades' work shall not be permitted. The use of tie wire for support or fastening of any raceway system is prohibited.

- C. Supports for raceways shall be of materials compatible with the raceway, of malleable iron, spring steel, stamped steel or other approved material. Die-cast fittings are not permitted for supports.
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- E. Minimum Hanger Rod Size for Raceway Supports: Minimum rod size shall be 1/4 inch in diameter, 20 threads per inch. Rods shall be furnished with a corrosion-resistant finish.
- F. Single Raceways or Cables:
 - 1. For Raceways 1-1/4-inch and smaller: Install adjustable steel band hanger suspended on threaded rod.
 - 2. For Raceways larger than 1-1/4-inch: Install trapeze-type supports fabricated with steel slotted support system suspended on threaded rods. Size trapeze members, including the suspension rods, based on the support required for the size, and loaded weight of the conduits.
 - a. Secure raceway or cable to support with two-bolt conduit clamps or single-bolt conduit clamps using spring friction action for retention in support channel.
 - 3. For Individual Raceways on Building Walls: Secure with two hole galvanized malleable iron or stamped steel pipe strap or "minerallac" 2-piece straps. The straps are to be anchored by an approved means such as expansion anchors, toggle bolts, through bolts, etc. Where required by codes or other standards, provide spacers behind mounting clamps to space conduits off walls.
 - 4. For Individual Raceways on Building Steel: Secure with clamp supports.
- G. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system suspended on threaded rods, where multiple raceways are run vertically or horizontally at the same elevations. Size trapeze members, including the suspension rods, based on the support required for the smallest conduit to be supported. Size so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with single-bolt conduit clamps.
- H. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

- A. Comply with NFPA 70, NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Fasten junction, pull and devices boxes securely to the building construction, independent of raceway system.
- C. Install Device Box Mounting Brackets supported between two studs where boxes are not located adjacent to stud or where multiple boxes are located between studs.
- D. Install Device Box Stabilizer where single box is located adjacent to stud.
- E. Install Through-Stud Cable and Raceway Support Clips where cables or raceways run horizontally through metal studs.
- F. Install Tee Bar Grid Box Hanger supported between two ceiling grid tee bars where devices boxes are located flush in recessed suspended ceilings.
 - 1. Install at least one independent support rod from box hanger to structure.
- G. Install Roof-mounted Raceway Support Blocking where raceways run on across roofing.
 - 1. Coordinate installation of roof supports with items specified in Division 07 Section "Roof Accessories." Provide products compatible with rooftop materials included in the Work.
- H. Provide minimum of two lock nuts per threaded support rod except where lock nut tightens against a threaded socket, one locknut may be used.
- I. Support raceways at a distance above suspended ceilings to permit removal of ceiling panels and luminaires.
 - 1. No raceway shall be installed on acoustic tile ceiling tees and support wire, or in any location that will impair the functioning, access or code-required clearances for any equipment or system.
- J. Locate raceways so as not to hinder access to mechanical equipment.
- K. Do not secure conductors, raceways, or supports to suspended ceiling hanger rods or wires.
- L. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- M. Where lighting fixtures, appliances or wiring devices are to be suspended from ceiling outlet boxes, they shall be provided with 3/4" rigid conduit pendants. Outlet boxes shall be malleable iron, provided with self-aligning covers with swivel ball joint (minimum 125 lb. support) and No. 14 gauge steel locking ring. Provide safety chain between building structure and ballast housing of light fixtures for all fixtures, appliances or devices greater than 10 lbs. weight. Fixtures shall be installed plumb and level. Cover pendants shall be finished to match fixtures.
- N. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.

2. To New Concrete: Bolt to concrete inserts. Where support anchors are required, establish their type and locate in concrete construction before concrete is poured, if possible. Fit each hanger rod with a nut at its upper end, and set nut in a universal concrete insert in the form. Where supported weight exceeds holding strength of a single insert, pass rods through top slot of inserts and interlock with reinforcing steel. Also, where particularly heavy loads are to be supported, suspend hanger rod or rods from a structural angle spanning two or more inserts and securely bolted thereto to distribute the weight.
 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 4. To Existing Concrete: Expansion anchor fasteners.
 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 6. To Light Steel: Sheet metal screws.
 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate. Attachment to gypsum wall board is not acceptable as sole support means.
- O. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars. Verify reinforcing locations with Structural Engineer. X-Ray existing concrete structures as required.
- 3.03 CONCRETE BASES
- A. Construct concrete bases of dimensions indicated but not less than 3 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
 - B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."
 - C. Anchor equipment to concrete base.
 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
- 3.04 PAINTING
- A. Touchup: Comply with requirements in Division 09 Section "Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
 - B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Nonmetal wireways and auxiliary gutters.
5. Surface raceways.
6. Boxes, enclosures, and cabinets.

B. Related Requirements:

1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior duct banks, manholes, handholes, and underground utility construction.

1.02 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical non-metallic tubing.
- C. EPC: Electrical Plastic Conduit
- D. EPDM: Ethylene-propylene-diene terpolymer rubber.
- E. FMC: Flexible metal conduit.
- F. GRC: Galvanized rigid steel conduit.
- G. IMC: Intermediate metal conduit.
- H. LFMC: Liquidtight flexible metal conduit.
- I. LFNC: Liquidtight flexible nonmetallic conduit.
- J. NBR: Acrylonitrile-butadiene rubber.
- K. RAC: Rigid aluminum conduit.
- L. RMC: Rigid metal conduit.
- M. RNC: Rigid nonmetallic conduit (PVC)
- N. RSC: Rigid Steel conduit.

1.03 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- C. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

1.04 INFORMATIONAL SUBMITTALS

- A. Source quality-control reports.

PART 2 - PRODUCTS

2.01 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. O-Z/Gedney; a brand of EGS Electrical Group.
6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. RSC: Comply with ANSI C80.1, UL 6, and NEMA FB 2.10; Galvanized rigid steel, each length with a coupling on one end and thread protector on opposite end.

- D. IMC: Comply with ANSI C80.6 and UL 1242.
 - E. Fittings for RSC and IMC: Provide factory made threaded couplings of same material as the conduit.
 - 1. Molded thermoplastic insulating bushing at all boxes and cabinets, with locknuts inside and outside box or cabinet. In wet locations, provide watertight hubs for conduit entry into enclosures.
 - 2. Thermoplastic insulated grounding bushing on all conduits where grounding bushings are required, with locknuts inside and outside the enclosure. In wet locations provide watertight hubs for conduit entry into enclosures.
 - 3. Expansion joints: O-Z/Gedney or acceptable submission, with internal ground and external bonding jumper.
 - a. Expansion fitting: Type AX.
 - b. End type expansion fitting: Type EXE.
 - c. Deflection fitting: Type DX.
 - d. Pull box fitting: Type EXPB.
 - e. Combination expansion/deflection fitting: Type AXDX.
 - F. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
 - G. EMT: Comply with ANSI C80.3 and UL 797.
 - H. FMC: Comply with UL 1; zinc-coated steel.
 - I. LFMC: Flexible steel conduit with flame retardant PVC jacket and copper grounding strand; comply with UL 360.
 - J. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
 - K. Joint Compound for IMC, RSC, or RAC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.
- 2.02 NONMETALLIC CONDUITS, TUBING, AND FITTINGS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.
 - 3. Amco Corporation.
 - 4. CANTEX Inc.
 - 5. CertainTeed Corp.
 - 6. Condux International, Inc.
 - 7. Electri-Flex Company.
 - 8. Kraloy.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Niedax-Kleinhuis USA, Inc.
 - 11. RACO; a Hubbell company.
 - 12. Thomas & Betts Corporation.
 - B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - C. ENT: Comply with NEMA TC 13 and UL 1653.
 - D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
 - E. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- 2.03 METAL WIREWAYS AND AUXILIARY GUTTERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman; a Pentair company.
 - 3. Mono-Systems, Inc.
 - 4. Square D; a brand of Schneider Electric.
 - B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
 - D. Wireway Covers: Hinged type unless otherwise indicated.
 - E. Finish: Manufacturer's standard enamel finish.
- 2.04 SURFACE RACEWAYS
- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Prime coated, ready for field painting.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Mono-Systems, Inc.
 - b. Panduit Corp.
 - c. Wiremold / Legrand.
- 2.05 BOXES, ENCLOSURES, AND CABINETS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Adalet.
 2. Cooper Technologies Company; Cooper Crouse-Hinds.
 3. EGS/Appleton Electric.
 4. Erickson Electrical Equipment Company.
 5. FSR Inc.
 6. Hoffman; a Pentair company.
 7. Hubbell Incorporated; Killark Division.
 8. Kraloy.
 9. Milbank Manufacturing Co.
 10. Mono-Systems, Inc.
 11. O-Z/Gedney; a brand of EGS Electrical Group.
 12. RACO; a Hubbell Company.
 13. Robroy Industries.
 14. Spring City Electrical Manufacturing Company.
 15. Stahlin Non-Metallic Enclosures; a division of Robroy Industries.
 16. Thomas & Betts Corporation.
 17. Wiremold / Legrand.
 - B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
 - C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
 - D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
 - E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
 - F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
 - G. Small Sheet Metal Pull and Junction Boxes: Comply with NEMA OS 1.
 1. Construct boxes from code gauge sheet steel no lighter than 14 gauge with overlapped riveted or welded corners and with edges turned to receive trim.
 2. Construct covers from same gauge as box with screw fasteners. Sectionalize boxes over 864 square inches.
 - H. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
 - I. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
 - J. Device Box Dimensions: 4 inches square by 2-1/8 inches deep .
 - K. Gangable boxes are prohibited.
 - L. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Nonmetallic Enclosures: Plastic.
 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
 - M. Cabinets:
 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.

4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

PART 3 - EXECUTION

3.01 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: RSC or IMC.
 2. Concealed Conduit, Aboveground: RSC or IMC.
 3. Underground Conduit: RSC.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Exposed Conduit at Cooling Towers: PVC-coated rigid steel conduit.
 6. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed and Subject to Physical Damage: RSC or IMC. Raceway locations include the following:
 - a. Loading dock.
 - b. Areas used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 - d. Gymnasiums.
 - e. Exposed below 8'-0" a.f.f.
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 5. Damp or Wet Locations: RSC or IMC.
 6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.
- H. Do not install nonmetallic conduit in environmental air plenums.
- I. Junction and Pull Boxes: Sheet steel boxes, unless otherwise indicated.
 1. Provide boxes no smaller than 4 inches square and 2-1/8 inches deep.
 2. Size all junction and pull boxes in accordance with the NFPA 70, unless project conditions dictate use of larger boxes.
 3. Boxes in Hazardous Areas: Cast metal boxes with appropriate sealing fittings.
- J. Outlet and Device Boxes: Sheet steel boxes, unless otherwise indicated.
 1. For Lighting Fixture Outlets: 4 inch square with raised fixture ring.
 2. For Wall Switches, Receptacles, and Communication Use: 4 inch square, one-piece. Use boxes with plaster rings in all plastered walls where wall thickness permits. Use boxes 1-1/2 inch deep only in locations where deep boxes cannot be accommodated by construction.
 3. Boxes in Hazardous Areas: Cast metal boxes with appropriate sealing fittings.
- K. Boxes Used Outdoors or in Damp/Wet Locations: Cast metal boxes with gasketed covers and threaded hubs.

3.02 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- B. Keep raceways at least 6 inches away from parallel runs and 1 inch away from perpendicular runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems" for hangers and supports.
- E. Arrange stub-ups so curved portions of bends are not visible above finished slab.
 - 1. Change from RNC to RSC or IMC before rising above the floor.
 - 2. Protect conduit openings with plastic caps approved for this purpose.
- F. Install no more than the equivalent of three 90-degree bends and a maximum of 150 feet between pull points in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- H. Support conduit within 12 inches of enclosures to which attached.
- I. All exposed conduit shall be installed on strut system racks with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends unless otherwise shown. All conduit shall have supports spaced not more than eight feet apart. Supports shall also be provided within 36" of all boxes, bends, and termination points. Where termination points are free standing, support shall be provided within 12". Conduits randomly routed will not be accepted. Conduits shall be concealed in open structure (no finished ceiling) where possible and painted to match.
- J. Level and square raceway runs, and install at proper elevations and required heights. Hold tight to structure wherever possible, to maximize available space and not restrict other trades. Do not attach or support from roof deck.
- K. Raceways Embedded in Slabs: Only allowed when connecting to floor boxes embedded in concrete slab.
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
 - 2. Do not cross building expansion joints with embedded conduits.
 - 3. Arrange raceways to keep a minimum of 1-inch of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from ENT to GRC before rising above floor.
- L. Raceways Installed Under Building Slab:
 - 1. Support ducts on duct separators coordinated with duct size and duct spacing.
 - 2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
 - 3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than 6 inches in nominal diameter.
 - 4. Install backfill as specified in Division 31 Section "Earth Moving."
 - a. Backfill shall be accomplished with clean debris free earth and tamped at 12-inch intervals so as to avoid earth sinks along the trench.
 - b. Backfill trenches only after conduit has been inspected by Agencies, Engineer and Owner, tested, and locations of lines have been recorded on Record Drawings. Provide at least one week's written notification to all parties of impending work that needs to be reviewed.
 - 5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving."
 - 6. Install ducts with a minimum of 3 inches between ducts for like services and 6 inches between power and signal ducts.
 - 7. Depth: Install top of duct bank at least 36 inches below finished grade, unless otherwise indicated.
 - 8. Set elevation of bottom of duct bank below the frost line.
 - 9. Stub-Ups: Install manufactured rigid steel conduit elbows for stub-ups at building entrances through the floor.
- M. Stub-ups to Above Recessed Ceilings:
 - 1. Use EMT, IMC, or RMC for raceways.
 - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

- P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- Q. EMT terminations at junction boxes, panelboards, etc. shall be made with case hardened locknuts and appropriate fittings, with insulated throat liners. Insulating terminations shall be manufactured as a single unit. The use of split sleeve insulators is not permitted.
- R. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- S. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- T. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- U. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- V. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- W. Surface Raceways:
 1. Install surface raceway with a minimum 2-inch radius control at bend points.
 2. Surface metal raceways and all components and fittings shall be furnished by a single manufacturer. All trim and cover fittings, flush feed boxes, splices, outlet fittings, etc. necessary for a complete installation shall be provided.
 3. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 36 inches, or 6 inches from ends and on either side of a corner, and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- X. Exposed raceways installed in exterior locations shall receive one coat of primer, two coats finish paint after preparation of galvanizing, color selected by Architect. Exposed raceways in interior painted areas shall be similarly painted.
- Y. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- Z. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- AA. Conduit shall be installed in such a manner so as to ensure against collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps. Trapped conduit runs shall be provided with explosion proof drains at low points. Runs of conduit between junctions shall not have more than the equivalent of three 90° bends.
- BB. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- CC. Expansion-Joint Fittings:
 1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
 2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
 - d. Attics: 135 deg F temperature change.
 3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.00078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
 4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement. Provide copper ground bonding jumper across expansion fitting.

- DD. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed luminaires. Use a maximum of 36 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
 - EE. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to bottom of box unless otherwise indicated.
 - FF. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.
 - GG. Locate boxes so that cover or plate will not span different building finishes.
 - HH. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
 - II. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel, unless intumescent putty pads are installed according to Division 07 Section "Firestopping."
 - JJ. Recessed Boxes in Fire-Rated Partitions: For boxes located on opposite sides of same partition do not install boxes back-to-back; separate boxes with a minimum of 24 inch separation, unless otherwise indicated in the installation requirements specified in Division 07 Section "Firestopping."
 - KK. Recessed Boxes in partitions around Acoustically-Sensitive Spaces: For boxes located on opposite sides of same partition do not install boxes back-to-back; separate boxes with a minimum of 24 inch separation. Acoustically-Sensitive Spaces include, but are not limited to, the following:
 - 1. Conference rooms, meeting rooms and similar spaces.
 - 2. Classrooms, training rooms and similar spaces.
 - 3. Interview rooms, consultation rooms and similar spaces.
 - 4. Auditoriums, lecture rooms, and similar spaces.
 - LL. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
 - MM. Set metal floor boxes level and flush with finished floor surface.
- 3.03 FIRESTOPPING
- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."
- 3.04 PROTECTION
- A. Protect coatings, finishes, and cabinets from damage and deterioration.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.
- 3.05 CONNECTIONS
- A. Ground raceways and boxes according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- 3.06 IDENTIFICATION
- A. Identify raceways and boxes as specified in Division 26 Section "Identification for Electrical Systems".
- 3.07 SEGREGATION OF WIRING SYSTEMS
- A. Segregation of wiring systems shall not be compromised by the use of common pullboxes, wireways, cabinets or any other type of enclosure.
 - B. The raceway system for each feeder shall be a separate system completely fault isolated from all other raceway systems.
 - C. The raceway system for the branch circuits of each panelboard shall be a separate system completely fault isolated from all other raceway systems.
 - D. In systems operating at more than 300 volts between phase conductors, and where different phase conductors are to be run to a common device or outlet box, provide code gauge barrier equal to box gauge between conductors so that two different phase wires will not be in the same compartment.
- 3.08 CLEANING
- A. On completion of raceway installation but before any cable is installed, perform the following:
 - 1. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
 - B. On completion of box, enclosure, and cabinet installation but before any cable or wiring devices are installed, inspect interior of boxes and perform the following:
 - 1. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 26 05 33

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

- 1.01 SUMMARY
- A. Section Includes:
1. Identification for raceways.
 2. Identification of power and control cables.
 3. Identification for conductors.
 4. Underground-line warning tape.
 5. Warning labels and signs.
 6. Instruction signs.
 7. Equipment identification labels.
 8. Miscellaneous identification products.
- B. Related Sections include the following:
1. Division 26 Section "Wiring Devices" for engraved wall plates and wiring device identification requirements.
- 1.02 ACTION SUBMITTALS
- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For each electrical identification product indicated.
- C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- D. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.
- 1.03 QUALITY ASSURANCE
- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- 1.04 COORDINATION
- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

- 2.01 CONDUCTOR IDENTIFICATION MATERIALS
- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Wraparound Labels: Write-on, 3-mil-thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Brady Corporation.
 - b. Gardner.
 - c. T&B.
 2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
 3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- 2.02 FLOOR MARKING TAPE
- A. 2-inch- wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
- 2.03 UNDERGROUND-LINE WARNING TAPE
- A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 4. Tape to be minimum 6 mil thick and 6-inches wide with aluminum backing to be detectable underground using a non-ferrous locator.
- B. Color and Printing:
1. Comply with ANSI Z535.1 through ANSI Z535.5.
 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE,.
 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.
- 2.04 WARNING LABELS AND SIGNS
- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR ## INCHES." Verify work space required for specific project conditions with NFPA 70 and replace "##" in previous sentence with appropriate distance.
 3. Arc Flash Warning and Instruction: "WARNING – ARC FLASH AND SHOCK HAZARD. WEAR APPROPRIATE PPE." Determine appropriate protective clothing and personal protective equipment (PPE) for the task from NFPA 70E.
- 2.05 EQUIPMENT IDENTIFICATION LABELS
- A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- a. Power Circuits:
 - 1) Normal: White lettering on Black background.
 - 2) Emergency and Legally Required Standby: White lettering on Red background.
 - 3) Optional Standby: White lettering on Red background.
- 2.06 CABLE TIES
- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
 3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
1. Minimum Width: 3/16 inch.
 2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
 3. UL 94 Flame Rating: 94V-0.
 4. Temperature Range: Minus 50 to plus 284 deg F.
 5. Color: Black.
- 2.07 MISCELLANEOUS IDENTIFICATION PRODUCTS
- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.
- B. Self-Adhesive, Color-Coded, Ceiling Markers: Ceiling marker to be Seton L12723 or equivalent. Division 26 related devices should utilize an orange identification marker on the ceiling grid.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Conductor Color-Coding Key: Install Instructional Label denoting the conductor color-coding scheme on all panelboards, distribution boards, switchboards, switchgear, motor-control center and similar equipment.
- F. All conductors shall be identified by color code and by means of labels placed on conductors in junction boxes and at terminal points with labels indicating source, circuit No. or terminal No.
- G. Conductor Color-Coding for Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1. Color shall be factory applied to conductors or for sizes larger than No. 8 AWG, if authorities having jurisdiction permit, field applied.
 - 2. Colors for Grounding Conductors:
 - a. Equipment Grounding Conductor: Green.
 - 3. Colors for 208/120-V Wye Systems:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Grounded Conductor (Neutral): White
 - 4. Colors for 480/277-V Wye Systems:
 - a. Phase A: Brown.
 - b. Phase B: Purple.
 - c. Phase C: Yellow.
 - d. Grounded Conductor (Neutral): Gray
 - 5. Control Wiring: Red, or as indicated.
 - 6. D.C. Wiring:
 - a. Positive: Light Blue
 - b. Negative: Dark Blue
 - 7. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous detectable underground-line warning tape approximately 18 inches above all concrete-encased ducts and direct bury duct banks. Align tape parallel to and within 3 inches of the centerline of duct bank. Provide an additional warning tape for each 12-inch increment of duct bank width over a nominal 18 inches. Space additional tapes 12 inches apart, horizontally.

3.02 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:
 - 1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 - 2. Wall surfaces directly external to raceways concealed within wall.
 - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
- C. Locations of Underground Lines: Identify with detectable underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- D. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- E. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
 1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
 5. For equipment requiring workspace clearance according to NFPA 70, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
 6. Arc Flash Warning Labels: Apply label to door or cover at all access point of equipment including, but not limited to, the following:
 - a. Disconnect switches.
 - b. Electrical switchboards.
 - c. Emergency system boxes and enclosures.
 - d. Enclosed circuit breakers.
 - e. Meter Sockets and assemblies.
 - f. Motor starters.
 - g. Motor-control centers.
 - h. Panelboards.
 - i. Power transfer equipment (ATS).
 - j. Transformers.
 7. Available Fault Current Field Marking: Apply label to cover of existing and new service equipment enclosure with the date in which the fault current was calculated and the available fault current as determined by the OCPD coordination study. Table 1 below lists a typical example of label format, coordinate project specific requirements with Drawings.

Table 1 (Example Only)

MAX. AVAILABLE FAULT: XX,XXXA DATE: X/X/XX

- F. Junction Boxes and Pull Boxes: Electrical systems shall be identified by painted junction boxes and covers with the following schemes:
 1. Lighting System: Yellow.
 2. Emergency Power System: Red.
 3. 120V Power System: Blue.
 4. HVAC System Power: Green.
 5. Identify voltage, source, and circuit number(s) on cover of pull and junction boxes with hand-written legible block lettering using black permanent marking pen at the completion of the Project.
- G. Wiring Devices: Identify each receptacle with panelboard identification and circuit number. For devices located within 6-foot of sink, use engraved machine printing with black-filled lettering on face of plate and durable wire markers or tags inside outlet boxes. For all other devices, use clear self-adhesive label with black lettering on face of plate and durable wire markers or tags inside outlet boxes.
- H. Labeling at Ceiling: Provide self-adhesive, color-coded, identification marker on ceiling grid directly below any device requiring power, service, or maintenance above the ceiling
- I. Labeling at HVAC Terminal Boxes Above Ceiling: Provide a permanent engraved label on each terminal box indicating the panel and circuit designation.
- J. Panelboard Naming Convention Sign: Inside each electrical room, provide an engraved, melamine sign with the panelboard naming convention legend mounted on a wall.
- K. Panelboard Directory: Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. A directory of each panelboard shall be completed and available for review by Engineer during final punch list inspection. Provide description of load and location (i.e. "Lighting, East Wall, Room 101").
- L. Electrical Room Door Sign: Provide an engraved, melamine sign on door of electrical room that states "Per Fire Marshal, no storage is allowed in this room."

- M. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where two lines of text or more are required, use label height as required to accommodate 3/8-inch-high letters.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label. Panelboard identification shall include the following:
 - 1) Panel Name.
 - 2) Voltage.
 - 3) Amperage.
 - 4) General description such as "Lighting Area B" or "Power Area C"
 - 5) Appropriately colored for emergency.
 - 6) Feeder panel designation must be clearly identified.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Switchboards.
 - e. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - f. Emergency system boxes and enclosures.
 - g. Motor-control centers.
 - h. Enclosed switches.
 - i. Enclosed circuit breakers.
 - j. Enclosed controllers.
 - k. Variable-speed controllers.
 - l. Push-button stations.
 - m. Power transfer equipment.
 - n. Contactors.
 - o. Remote-controlled switches, dimmer modules, and control devices.
 - p. Power-generating units.
 - q. Monitoring and control equipment.

END OF SECTION 26 05 53

SECTION 26 05 73 - OVERCURRENT PROTECTIVE DEVICE STUDIES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for computer-based, fault-current and overcurrent protective device coordination studies. Protective devices shall be set based on Engineer's review of submitted results of the protective device coordination study.
 - 1. Coordination of series-rated devices is not permitted.
 - 2. Delegated Design Requirements for Arc Flash Hazard Analysis.

1.02 PERFORMANCE REQUIREMENTS

- A. Overcurrent Protective Device Coordination for Emergency Systems and Legally Required Standby Systems: All overcurrent protective devices proposed for inclusion in the Work on the Emergency Systems branch and the Legally Required Standby System branch shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for both normal and emergency power.
- B. Overcurrent Protective Device Coordination: All other overcurrent protective devices proposed for inclusion in the Work shall be selected to be coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power to 0.10 seconds.
- C. Delegated Design for Arc Flash Hazard Analysis: Prepare computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.

1.03 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For computer software program to be used for studies.
- C. Simultaneous Action Submittals: The following action submittals shall be made in conjunction with the approval process for system protective devices specified in other Division 26 Sections. The release of electrical equipment submittals (panelboards, engine generators, switchgear, etc.) is dependent on the receipt of a complete and accurate overcurrent protective device coordination study. The Architect and Engineer require a full submittal review period as delineated in Division 01 Section "Submittal Procedures" to adequately review the OCPD study against the submitted electrical components prior to release of submittals for equipment procurement. The submittal schedule required by Division 01 requirements shall provide for this review time in the action submittal process. Delay claims arising due to Contractor's failure to coordinate simultaneous action submittals will not be considered by the Owner. The following submittals shall be in digital form:
 - 1. Coordination-study input data, including completed computer program input data sheets.
 - 2. Study and Equipment Evaluation Reports.
 - 3. Coordination-Study Report.
 - 4. Arc flash study input data, including completed computer program input data sheets.
 - 5. Arc Flash Hazard Analysis Report.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For coordination-study specialist.
- B. Product Certificates: For coordination-study and fault-current-study computer software programs, certifying compliance with IEEE 399. For arc flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
 - a. The following parts from the Protective Device Coordination Study Report:
 - 1) One-line diagram.
 - 2) Protective device coordination study.
 - 3) Time-current coordination curves.
 - 4) Coordination setting schedules.
 - b. Power system data.
- B. Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.
- C. Operation and Maintenance Procedures: In addition to items specified in Division 01 Section "Closeout Procedures," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

- 1.06 QUALITY ASSURANCE
- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are not acceptable.
 - B. Coordination-Study Specialist Qualifications: An entity experienced in the application of computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
 - 1. Professional engineer, licensed in the state where Project is located, shall be responsible for the study. All elements of the study shall be performed under the direct supervision and control of engineer.
 - C. Comply with IEEE 242 for short-circuit currents and coordination time intervals.
 - D. Comply with IEEE 399 for general study procedures.
 - E. Comply with IEEE 1584 for performing Arc Flash Hazard Calculations.

PART 2 - PRODUCTS

2.01 COMPUTER SOFTWARE DEVELOPERS

- A. Computer Software Developers: Subject to compliance with requirements, provide products by one of the following:
 - 1. SKM Systems Analysis, Inc.

2.02 COMPUTER SOFTWARE PROGRAM REQUIREMENTS

- A. Comply with IEEE 242 and IEEE 399 for fault-current and overcurrent protective device coordination studies.
- B. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

2.03 SHORT-CIRCUIT STUDY REPORT CONTENTS

- A. Executive Summary
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Cable size and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center and panelboard designations.
- D. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.
- E. Short-Circuit Study Output:
 - 1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

2.04 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
 - 1. Protective device designations and ampere ratings.
 - 2. Cable size and lengths.
 - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 - 4. Motor and generator designations and kVA ratings.
 - 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article above.
- F. Protective Device Coordination Study:
 - 1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
 - a. Phase and Ground Relays:

- 1) Device tag.
 - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
 - 3) Recommendations on improved relaying systems, if applicable.
 - b. Circuit Breakers:
 - 1) Adjustable pickups and time delays (long time, short time, ground).
 - 2) Adjustable time-current characteristic.
 - 3) Adjustable instantaneous pickup.
 - 4) Recommendations on improved trip systems, if applicable.
 - c. Fuses: Show current rating, voltage, and class.
- G. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
 2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
 3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
 4. Plot the following listed characteristic curves, as applicable:
 - a. Power utility's overcurrent protective device.
 - b. Medium-voltage equipment overcurrent relays.
 - c. Medium- and low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - d. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
 - e. Transformer full-load current, magnetizing inrush current, and ANSI through-fault protection curves.
 - f. Cables and conductors damage curves.
 - g. Ground-fault protective devices.
 - h. Motor-starting characteristics and motor damage points.
 - i. The largest feeder circuit breaker in each motor-control center and panelboard.
 5. Provide adequate time margins between device characteristics such that selective operation is achieved.
 6. Comments and recommendations for system improvements.
- 2.05 ARC FLASH STUDY REPORT CONTENT
- A. Executive summary.
 - B. Study descriptions, purpose, basis and scope.
 - C. One-line diagram, showing the following:
 1. Protective device designations and ampere ratings.
 2. Cable size and lengths.
 3. Transformer kilovolt ampere (kVA) and voltage ratings.
 4. Motor and generator designations and kVA ratings.
 5. Switchgear, switchboard, motor-control center and panelboard designations.
 - D. Study Input Data: As described in "Power System Data" Article.
 - E. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article above.
 - F. Arc-Flash Study Output:
 1. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - a. Voltage.
 - b. Calculated symmetrical fault-current magnitude and angle.
 - c. Fault-point X/R ratio.
 - d. No AC Decrement (NACD) ratio.
 - e. Equivalent impedance.
 - f. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - g. Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.
 - G. Incident Energy and Flash Protection Boundary Calculations:
 1. Arcing fault magnitude.
 2. Protective device clearing time.
 3. Duration of arc.
 4. Arc-flash boundary.

5. Working distance.
 6. Incident energy.
 7. Hazard risk category.
 8. Recommendations for arc-flash energy reduction.
- H. Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.
- I. Equipment specific Arc Flash Warning Labels.
- 2.06 ARC-FLASH WARNING LABELS
- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems." Produce a 3.5-by-5-inch thermal transfer label of high-adhesion polyester for each work location included in the analysis.
- B. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
1. Flash Hazard Boundary
 2. Short Circuit Current Available
 3. Shock Hazard when Cover is Removed
 4. Limited Approach Boundary
 5. Restricted Approach Boundary
 6. Prohibited Approach Boundary
 7. PPE Requirements, including the following:
 - a. Hazard Risk Category
 - b. Required Minimum Arc Rating of PPE in cal/cm²
 - c. Clothing Description
 8. Engineering report number, revision number, and issue date.
- C. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
1. Proceed with coordination study only after relevant equipment submittals have been assembled.
 - a. Coordination study shall accompany submission of relevant equipment submittals.

3.02 POWER SYSTEM DATA

- A. Delegated Design System Analyst performing the short-circuit, protective device coordination study and arc flash hazard analysis shall furnish the Contractor with a list of required data immediately after award of the contract. Contractor shall expedite collection of the data to ensure completion of the study and analysis as required.
- B. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
- C. Source combination shall include present and future motors and generators indicated in the documents.
- D. If applicable, include fault contribution of existing motors in the study and analysis.
- E. Gather and tabulate the following input data to support coordination study:
1. Product Data for overcurrent protective devices specified in other Division 26 Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 2. Impedance of utility service entrance.
 3. Electrical Distribution System Diagram: In hard-copy and electronic-copy formats, showing the following:
 - a. Circuit-breaker and fuse-current ratings and types.
 - b. Relays and associated power and current transformer ratings and ratios.
 - c. Transformer kilovolt amperes, primary and secondary voltages, connection type, impedance, and X/R ratios.
 - d. Generator short-circuit current contribution data, including short-circuit reactance, rated kilovolt amperes, size, rated voltage, and X/R ratio.
 - e. Cables: Indicate conduit material, sizes of conductors, conductor material, insulation, and length.
 - f. Busway ampacity, impedance, lengths, and conductor material.
 - g. Motor horsepower and code letter designation according to NEMA MG 1.
 - h. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
 - i. Medium-voltage cable sizes, lengths, conductor material, and cable construction and metallic shield performance parameters.

4. Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
 - a. Special load considerations, including starting inrush currents and frequent starting and stopping.
 - b. Transformer characteristics, including primary protective device, magnetic inrush current, and overload capability.
 - c. Motor full-load current, locked rotor current, service factor, starting time, type of start, and thermal-damage curve.
 - d. Generator thermal-damage curve.
 - e. Ratings, types, and settings of utility company's overcurrent protective devices.
 - f. Time-current-characteristic curves of devices indicated to be coordinated.
 - g. Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - h. Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - i. Panelboards, switchboards, motor-control center ampacity, and interrupting rating in amperes rms symmetrical.

3.03 FAULT-CURRENT STUDY

- A. A short-circuit current ratings indicated in the Contract Documents are based on Fault-Current study prepared by the Engineer during design and are based on available information and anticipated feeder lengths. Calculate the maximum available short-circuit current in amperes rms symmetrical at circuit-breaker positions of the electrical power distribution system. The calculation shall be for a current immediately after initiation and for a three-phase bolted short circuit at each of the following:
 1. Electric Utility's supply termination point.
 2. Service Entrance Equipment: Existing.
 3. Switchboard bus.
 4. Distribution panelboard.
 5. Branch circuit panelboard.
 6. Enclosed Fused Switch.
 7. Enclosed Circuit Breaker.
- B. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Include studies of system-switching configurations and alternate operations that could result in maximum fault conditions.
- C. Calculate momentary and interrupting duties on the basis of maximum available fault current.
- D. Calculate short-circuit currents according to IEEE 551.
- E. In addition to IEEE 551 short-circuit current calculations, calculate the short-circuit currents at the following:
 1. Motor Controllers: Rated greater than or equal to 2hp at 300V or more.
 2. Air-Conditioning and Refrigerating Equipment Controllers: Including, but not limited to, equipment supplied from a branch circuit protected at greater than 60A.
 3. Elevator Controllers.
- F. Calculations to verify interrupting ratings of overcurrent protective devices shall comply with IEEE 241 and IEEE 242.
 1. Transformers:
 - a. ANSI C57.12.10.
 - b. ANSI C57.12.22.
 - c. ANSI C57.12.40.
 - d. IEEE C57.12.00.
 - e. IEEE C57.96.
 2. Low-Voltage Circuit Breakers: IEEE 1015 and IEEE C37.20.1.
 3. Low-Voltage Fuses: IEEE C37.46.
- G. Study Report:
 1. Show calculated X/R ratios and equipment interrupting rating (1/2-cycle) fault currents on electrical distribution system diagram, including existing and new Service Entrance equipment.
- H. Equipment Evaluation Report:
 1. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
 2. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.

3. Ensure that short-circuit withstand ratings are equal to or higher than the calculated 1/2-cycle symmetrical fault current for the following:
 - a. Electrical Distribution Equipment: Including, but not limited to, switchgear, switchboards, and panel boards.
 - b. Motor Controllers.
 - c. Air-Conditioning and Refrigerating Equipment Controllers.
4. Verify adequacy of phase conductors at maximum three-phase bolted fault currents; verify adequacy of equipment grounding conductors and grounding electrode conductors at maximum ground-fault currents. Ensure that short-circuit withstand ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
5. Notify Engineer, in writing, of any existing circuit protective devices improperly rated for the calculated available fault current.

3.04 COORDINATION STUDY

- A. Perform coordination study using approved computer software program. Prepare a written report using results of fault-current study. Comply with IEEE 399.
 1. Calculate the maximum and minimum 1/2-cycle short-circuit currents.
 2. Calculate the maximum and minimum ground-fault currents.
- B. Comply with IEEE 242 recommendations for fault currents and time intervals.
- C. Transformer Primary Overcurrent Protective Devices:
 1. Device shall not operate in response to the following:
 - a. Inrush current when first energized.
 - b. Self-cooled, full-load current or forced-air-cooled, full-load current, whichever is specified for that transformer.
 - c. Permissible transformer overloads according to IEEE C57.96 if required by unusual loading or emergency conditions.
 2. Device settings shall protect transformers according to IEEE C57.12.00, for fault currents.
- D. Conductor Protection: Protect cables against damage from fault currents according to ICEA P-32-382, ICEA P-45-482, and conductor melting curves in IEEE 242. Demonstrate that equipment withstands the maximum short-circuit current for a time equivalent to the tripping time of the primary relay protection or total clearing time of the fuse. To determine temperatures that damage insulation, use curves from cable manufacturers or from listed standards indicating conductor size and short-circuit current.
- E. Coordination-Study Report: Prepare a written report indicating the following results of coordination study:
 1. Tabular Format of Settings Selected for Overcurrent Protective Devices:
 - a. Device tag.
 - b. Relay-current transformer ratios; and tap, time-dial, and instantaneous-pickup values.
 - c. Circuit-breaker sensor rating; and long-time, short-time, and instantaneous settings.
 - d. Fuse-current rating and type.
 - e. Ground-fault relay-pickup and time-delay settings.
 2. Coordination Curves: Prepared to determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
 - a. Device tag.
 - b. Voltage and current ratio for curves.
 - c. Three-phase and single-phase damage points for each transformer.
 - d. No damage, melting, and clearing curves for fuses.
 - e. Cable damage curves.
 - f. Transformer inrush points.
 - g. Maximum fault-current cutoff point.
 - h. Motor starting characteristics, damage points and overload relay.
 - i. Thermal damage curve for motors larger than 100 HP.
- F. Completed data sheets for setting of overcurrent protective devices.
- G. Complete Schedule of breaker settings to summarize information contained on data sheets. Sample schedule has been included at the end of this section for preferred format.

3.05 ARC FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- B. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system where work could be performed on energized parts including, but not limited to, the following:
 1. Disconnect switches.
 2. Electrical switchgear and switchboards.
 3. Enclosed circuit breakers.

4. Motor starter.
 5. Panelboards.
 6. Transformers.
- C. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent protection relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.
 - D. Calculate the arc-flash protection boundary and the corresponding incident energy calculations for multiple system scenarios to be compared and the greatest incident energy to be uniquely reported for each equipment location. Calculations to be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions.
 1. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off).
 2. The maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating.
 - E. Incident energy calculations shall consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors to be decremented as follows:
 1. Fault contribution from induction motors should not be considered beyond 3-5 cycles.
 2. Fault contribution from synchronous motors should be decayed to match the actual decrement of each as closely as possible.
 - F. For each equipment location with a separately enclosed main device, calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.
 1. When performing incident energy calculations on the line side of a main breaker, the line side and load side contributions must be included in the fault calculation.
 - G. Mis-coordination should be checked amongst all devices within the branch containing the immediate protective device to compute the incident energy for the corresponding location.
 - H. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584 section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash even, a maximum clearing time based on the specific location shall be utilized.
 - I. Complete Arc Flash report to be used for the preparation of Arc Flash Warning labels for electrical equipment. Refer to Division 26 Section "Identification for Electrical Systems" for requirements of Arc Flash Study and labels.
- 3.06 CORRECT DEFICIENCIES, RE-CALULCATE AND REPORT
- A. After Engineer's initial review, correct unsatisfactory conditions and recalculate to demonstrate compliance; resubmit overcurrent protective devices as required to bring system into compliance.
 - B. Revise and Resubmit report multiple times as necessary to demonstrate compliance with requirements.
- 3.07 APPLICATION OF WARNING LABELS
- A. Install arc-flash warning labels as specified in Division 26 Section "Identification for Electrical Systems". Install labels under the direct supervision and control of the Arc-Flash Hazard Study Specialist.

END OF SECTION 26 05 73

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes commissioning process requirements for electrical systems, assemblies, and equipment.
- B. The purpose of the commissioning process is to provide the Owner/Operator of the facility with a high level of assurance that the electrical systems have been installed in the prescribed manner, and operate within the performance guidelines set in the Basis of Design Documents (BoD). The CA shall provide the Owner with an unbiased, objective view of the system's installation, operation, and performance. This process is not intended to take away or reduce the responsibility of the design team or installing contractors to provide a finished product. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for beneficial use by the Owner. The CA will be a member of the construction team, administrating and coordinating commissioning activities with the design team, construction manager, subcontractors, manufacturers and equipment suppliers.
- C. The independent commissioning agent (CA) is contracted directly with the Owner for this Project. This Specification has been included for reference only to define Contractors' responsibilities. Each contractor should review this procedure and include adequate time in their proposal.
- D. Related Sections:
 - 1. Division 01 Section "General Commissioning Requirements" for general commissioning process requirements.
 - 2. Division 22 Section "Commissioning of Plumbing" for plumbing systems commissioning requirements.
 - 3. Division 23 Section "Commissioning of HVAC" for HVAC systems commissioning requirements.

1.02 DEFINITIONS

- A. BoD: Basis of Design Documents.
- B. CA: Commissioning Agent.
- C. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- D. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.03 REFERENCES

- A. ASHRAE Guideline 1 – 1996.
- B. ASHRAE Guideline 0 – 2005.
- C. AGC Commissioning Guideline – 2005.

1.04 INFORMATIONAL SUBMITTALS

- A. Certificates of readiness.
- B. Certificates of completion of installation, prestart, and startup activities.

1.05 COMMISSIONING DOCUMENTATION

- A. Provide the following information to the CA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for electrical systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
 - 5. Test and inspection reports and certificates.
 - 6. Corrective action documents.

1.06 SCHEDULING

- A. Commissioning shall comply with the Construction Contract schedule. Cooperate with the CxA in the following manner:
 - 1. Allow sufficient time before final completion dates so that test and balance and commissioning testing can be accomplished.
 - 2. Provide labor and material to make corrections when required without undue delay.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all necessary test equipment to confirm proper operation of the Electrical Systems.
- B. All testing equipment shall be properly calibrated and documentation of such calibration shall be submitted prior to any verification testing.

PART 3 - EXECUTION

3.01 ROLES OF THE COMMISSIONING AGENCY

- A. The primary point of responsibility is to inform the Construction Manager, the Owner and Design Team on the status, integration, and performance of Electrical systems within the facility.
- B. The CA shall function as a catalyst and initiator to disseminate information and assist the design and construction teams in implementing completion of the construction process. This shall include system verification, functional performance testing, and conformance with the intended design of each system. Services include documenting construction observations, verification and functional performance testing, and documenting proper distribution of performance and operating information to the Owner's O&M staff.
- C. Assist the responsible parties to maintain a high-quality level of installation by meeting or exceeding prevailing standards and specifications.
- D. The CA shall observe and coordinate testing as required to assure system performance meets the design intent.
- E. The CA shall document the results of the performance testing directly and/or assure that the appropriate technicians document testing. The CA shall approve standard forms to be used by all parties for consistency of approach and type of information to be recorded.
- F. The CA shall provide technical expertise to oversee and verify the correction of deficiencies found during the commissioning process.
- G. The CA is to remain an independent party with specific knowledge of the project. The CA shall investigate the scope and extent of the problem and facilitate communication to determine responsibilities by delineating specifications. The CA shall monitor resolution for conformance with design intent and prevailing industry standards.
- H. The CA shall document the date of acceptance as determined by the Construction Manager, Owner and Design Team. System Verification Checklists and Functional Performance Test results may be used in determining the start of the warranty period for Electrical systems and subsystems.
- I. The CA will review operating and maintenance materials for Electrical systems.
- J. The CA will review phasing plans as provided by the CM relating to temporary use of Electrical equipment, O&M considerations, warranty issues, impact of construction sequencing on occupied areas, and interruption of services from the existing equipment.

3.02 RESPONSIBILITIES OF TEAM MEMBERS

- A. Construction Manager (CM):
 - 1. Include commissioning requirements in the mechanical, electrical, and controls contracts, as well as other subcontracts, to assure full cooperation of all parties in the Electrical commissioning process.
 - 2. Assure acceptable representation, with the means and authority to prepare and coordinate execution of the electrical commissioning program as described in the contract documents.
 - 3. Assure that the CA shall receive a copy of all construction documents, addenda, change orders and appropriate approved submittals and shop drawings for review and use in development of the commissioning plan.
 - 4. Coordinate inclusion of commissioning activities in the construction schedule.
 - 5. Facilitate resolution of deficiencies identified by observation or performance testing.
- B. Electrical Contractor (EC):
 - 1. Include cost for commissioning requirements in the Contract price.
 - 2. Review design for provision of power to the Electrical equipment.
 - 3. Attend commissioning meetings scheduled by the CA.
 - 4. Verify proper installation and performance of all Electrical services provided.
 - 5. Complete System Verification Checklists and manufacturer's pre-start checklists prior to scheduling startup of equipment.
 - 6. Monitor and respond to Resolution Tracking Forms distributed by the CA in order to expedite corrective actions necessary to achieve design intent.
 - 7. Provide an Electrical system technician to assist during verification and performance testing.
 - 8. Participate in the Functional Performance Tests as required to achieve design intent.
 - 9. Participate in the off-season mode testing as required to achieve design intent.
 - 10. Participate in O&M Training as required by Project Specifications.

3.03 SYSTEMS INCLUDED IN THE COMMISSIONING PROCESS

- A. Emergency Power System.
- B. Lighting Control Systems.

3.04 ELECTRICAL COMMISSIONING PLAN

- A. Commissioning Team:
 - 1. The Commissioning Team (CT) shall consist of key parties involved in design, construction and testing of this facility. It is necessary for each agency to appoint team members that will have long-term commitments to this project. Switching team members during the project will reduce the ability of the CT to provide continuity and acceptable

results to the Owner. Team members must maintain an ongoing supervisory position on this project. One team member shall be provided by each of the parties listed below:

- a. Facilities Management Division (FMD)
- b. Commissioning Agent (CA)
- c. Design Team (DT)
- d. Construction Manager (CM)
- e. Mechanical Contractor (MC)
- f. Plumbing Contractor (PC)
- g. Controls Contractor (CC)
- h. Test and Balance Contractor (TABC)
- i. Electrical Contractor (EC)

B. Basis of Design Document:

1. The Basis of Design Document (BoD) represents a composite of design drawings, project specifications, submittals, change orders and industry standards that describe the systems of this facility. References to design intent will be taken from these contract documents. The BoD is an evolving manuscript maintained by the design professional to track and incorporate design alterations that occur throughout the construction process. Any industry standards used for this project will be specifically noted when referenced.
2. The CA will review the BoD documents for adequate commissioning provisions, functional performance, optimization of performance, accessibility, TAB provisions, and O&M considerations.

C. Commissioning Meetings:

1. Commissioning meetings will be held in conjunction with construction progress meetings as necessary. Commissioning meetings will be used to address any problems that alter the design intent or affect the commissioning process. These meetings provide an open forum for exchange of ideas between contractors, vendors, designers, users and owners.

D. Resolution Tracking Forms (RTF):

1. The use of Resolution Tracking Forms is a method employed by the CA to monitor and record problems, their causes, and solutions. The use of these lists promotes communication between the installing contractors, Design Team, Commissioning Agent, and Owner, in order to expedite their resolution in a timely manner.
2. The CA will regularly submit RTF's to the CT in order to document and resolve deficiencies as quickly as possible. The frequency of RTF submission will be adjusted as project conditions dictate.

E. System Verification Checklists (SVC) / Manufacturers' Checklists

1. The CA will write SVC's based on the BoD. These tests will be created for systems and subsystems. See SYSTEMS INCLUDED IN THE COMMISSIONING PROCESS. Draft copies will be submitted to the CT for review and comment prior to placement on the job site. A master copy of the SVC's will be bound in a three-ring binder and placed on the job site for use by the installing contractors. No system will be started until the appropriate SVC's have been completed.
2. The CA will review the SVC for each piece of equipment prior to start-up. Equipment will be released for start-up only after these checklists have been completed by the installing contractor and reviewed by the CA.
3. The equipment manufacturers' checklists must also be reviewed by the CA prior to start-up. These lists must be completed by the installing contractor, and reviewed by the CA before start-up can commence.

F. Start-Up

1. The appropriate contractors and/or manufacturer's representative will be required on site to perform start-up. No system will be started until the appropriate SVC's have been completed. No system will be started until the Manufacturer's checklists have been completed. Start-up will be performed according to the Manufacturer's recommended procedures. The CA will visit the site to review completeness of installation in conjunction with progress meetings prior to starting Electrical equipment.
2. CT members involved in installation, fabrication, manufacture, control, or design of equipment are required to be present at the time of start-up. A factory-authorized technician will be on site to start equipment when required by the specifications. This will minimize delays in bringing equipment on line and expedite acceptable functional performance in accordance with the BoD.

G. Functional Performance Tests (FPT)

1. The CA will write FPT's based on the BoD. These tests will be created for systems and subsystems. See SYSTEMS INCLUDED IN THE COMMISSIONING PROCESS above.
2. Each major system will be tested. A random sample of each subsystem will be tested. This will be coordinated and witnessed by the CA and the Owner's maintenance staff. Witnessing the FPT's will serve as a compliment to the O&M Training. No FPT's will be performed until the system and related subsystems have been started, the TAB report has been submitted and reviewed, and the completion of the control system has been documented through point-to-point checklists and other documentation.

3. The Functional Performance Tests shall include Electrical, Lighting and related equipment.
 - a. The Electrical trade representative, with the CA present, will field test for power operation for the emergency generator and transfer switches.
 - b. Lighting controls will be tested under relevant operating conditions.
 4. Deferred Testing
 - a. If tests cannot be completed because of a deficiency outside the scope of the responsible contractor, the deficiencies shall be documented and reported to the Owner. Deficiencies shall be resolved and corrected by the appropriate parties and test rescheduled.
 - b. Off-season mode testing will be implemented as necessary to assure conformance with the BoD. Installing contractors will be expected to participate as required by the Project Specifications.
 5. Rescheduled Functional Performance Test
 - a. During Functional Performance Testing period, it is assumed that the contractors will be complete with all checklists when the commissioning agents travel to site. If the work is not ready for commissioning when the commissioning personnel are on site, their time will be billed at a rate of \$1500.00 per day to the contractor as an additional fee.
 - b. If the contractor has deficiencies that cannot be corrected at the time of the test, that part of the sequence will be retested at a later date. If the deficiency does not pass during the retest, the contractor will be billed \$1500.00 per day for the commissioning personnel's return trip.
- H. Building Turn-Over / Owner Orientation / User Training
1. The CA will assist contractors prepare, coordinate and review O&M manuals, working closely with each contractor to achieve specificity and completeness.
 2. The CA will review as-built drawings, working closely with each contractor to achieve specificity and completeness.
 3. Owner training will be coordinated with the assistance of the CA. The training will be provided by the installing contractor, or manufacturer's representative. This training should include both classroom training and hands-on operational training. The Owner may choose to videotape this training for future use. The CA will visit the site during the Turn-Over and Training period to assure that any on-going Electrical related problems are being addressed and corrected in a timely and efficient manner.
 4. The CA will assist the Owner/user with warranty issues.
 5. The CA will assist in the coordination of off-season testing, calibrating, and servicing as specified in the contract documents.

END OF SECTION 26 08 00

SECTION 26 09 23 – LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Lighting room controllers.
2. Lighting control relays.
3. Indoor, low-voltage, ceiling-mounted occupancy sensors.
4. Indoor, low-voltage, wall-mounted occupancy sensors.
5. Low-voltage, momentary switches.
6. Wall switch sensor light switches with dual technology sensors.
7. Emergency lighting control.
8. Lighting contactors.

B. Related Requirements:

1. Division 26 Section "Wiring Devices" for manual light switches and wall plates.

1.02 PERFORMANCE REQUIREMENTS

A. Lighting Control System shall accommodate the square-footage coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors, switches, daylighting sensors and accessories that suit the required lighting and electrical system parameters.

B. System shall conform to requirements of NFPA 70.

C. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.

D. System shall be listed under UL sections 916 and/or 508.

E. Delegated Design: These specifications and the accompanying Drawings define the intent of the lighting control system to be provided. The switches, sensors, control stations and switching group designations shown on the Drawings define how lighting should be grouped for control. Provide the necessary quantity and type of distributed control products necessary to achieve the design intent. In addition to the system as specified herein and shown on the Drawings, provide all planning, design, calculations, equipment, devices, cabling, system programming and any other component or service required for a complete, fully operational and code compliant system.

F. Interlock all lighting contactor-controlled fixtures inside building with both the fire alarm system and the intrusion detection system to achieve the following functions:

1. Interlock with fire alarm to enable all contactor-controlled fixtures to "ON" status upon fire alarm activation.
2. Interlock with intrusion detection security system to turn "OFF" all contactor-controlled fixtures upon arming of system.
3. Interlock with intrusion detection security system to turn "ON" all contactor-controlled fixtures upon intruder activation.
4. Interlock with intrusion detection security system to turn "ON" all contactor-controlled fixtures in corridors and custodial areas upon disarming of system.

1.03 ACTION SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.

B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals".

C. Product Data: For each type of product.

1. Catalog sheets and specifications.
2. Ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements and installed features.
3. Storage and handling requirements and recommendations.
4. Installation instructions.

D. Shop Drawings: Wiring diagrams for the various components of the system specified including:

1. Composite wiring and/or schematic diagram of each control circuit, as proposed, to be installed.
2. Show location of all devices, including at minimum sensors, load controllers, and switches/dimmers for each area on Drawings.
3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.

E. Maintenance Data: Include instructions for replacing and maintaining coil and contacts.

1.04 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

- B. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.
 - C. Sample Warranty: For manufacturer's special warranty.
- 1.05 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals, include the following:
 1. Approved Shop Drawings and product data.
 2. Sequence of Operation, identifying operation for each room or area.
 3. Manufacturer's maintenance information.
 4. Detailed information on device programming and setup.
 5. Startup and test reports.
 - B. Project Record Documents: Record actual installed locations and settings for lighting control devices.
 - C. Warranty: Copy of special warranty.
- 1.06 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Occupancy Sensors: Provide 1 of each product type for every 100 installed, to be used for maintenance.
 2. Daylight Sensors: Provide 1 of each product type for every 50 installed, to be used for maintenance.
 3. Wallstations: Provide 1 of each product type for every 100 installed, to be used for maintenance.
 4. Room Controller: Provide 1 of each product type for every 100 installed, to be used for maintenance.
- 1.07 COORDINATION
- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including but not limited to luminaires, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.
- 1.08 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Company specializing in manufacturing of centralized and distributed lighting control systems with a minimum of 10 years documented experience.
 - B. Installer Qualifications: Company certified by the manufacturer and specializing in installation of lighting control products with minimum three years documented experience.
 - C. Systems Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.
 - D. Testing Agency Qualifications: Accredited by NETA.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.
 - E. All components shall be UL 916 listed (or listed with other equivalent listing sources) as an energy management system.
 - F. All control wiring shall be in accordance to the NEC for class 2 remote control systems (Article 725).
 - G. The lighting control system shall comply with all IECC 2015 energy codes (at a minimum). If local or state energy codes exceed this requirement, those codes shall be the reference standard for compliance.
 - H. Comply with the latest edition of the NEC and all local/state codes as required.
 - I. Source Limitations: Obtain control systems from a single manufacturer.
- 1.09 DELIVERY, STORAGE, AND HANDLING
- A. Packaging: All components of the lighting control system shall be packaged in a single box or as individual components. The catalog number will be marked on package label along with bill of materials. Individual component packages will be marked with product catalog number.
 - B. Handling: Packaging will include clear installation instructions for all components with typical illustrations of installation locations and connections. The installing contractor can easily match each package to the layout on the design floor plans.
 - C. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.
- 1.10 PROJECT CONDITIONS
- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - B. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 1. Ambient temperature: 32° to 104° F.
 2. Relative Humidity: Maximum 90 percent, non-condensing.
 - C. Coordinate layout and installation of luminaires and controls with other construction.
 - D. Coordinate site commissioning with manufacturer no less than 21 days prior to required date.
- 1.11 WARRANTY
- A. Warranty: Manufacturer agrees to repair or replace components of lighting control devices that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Damage from transient voltage surges.

2. Warranty Period: Cost to repair or replace any parts for five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Intelligent Lighting Controls EVO Distributed Controls System or a comparable product by one of the following:
 1. Acuity Brands.
 2. Cooper Lighting Controls.
 3. Lutron Electronics Co., Inc.

2.02 LIGHTING CONTROL SYSTEM

- A. Provide Lighting Control System complete with all necessary enclosures, wiring, and system components to ensure a complete and properly functioning system as indicated on Drawings and specified herein.
 1. Space Control Requirements: Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality as indicated in all spaces except corridors, toilet rooms, storerooms, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate.
 2. Plug Loads: Provide automatic shut off of non-essential water cooler plug loads in spaces as indicated on Drawings. Provide Automatic-ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
 3. Daylit Areas: Provide daylight-responsive automatic control in spaces where daylight contribution is available as defined by relevant local building energy code:
 - a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.
 - b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.
 - c. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.
- B. Equipment Required: Lighting Control System as defined under this section covers the following equipment.
 1. Lighting Control local network: Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
 2. Room Controllers: Self-configuring, digitally addressable two or four relay plenum-rated controllers for on/off control. Selected models include 0-10 volt or line voltage forward phase control dimming outputs and integral current monitoring capabilities.
 3. Plug Load Controllers: Self-configuring, digitally addressable, single relay, plenum-rated application-specific controllers. Selected models include integral current monitoring capabilities.
 4. Occupancy Sensors: Self-configuring, digitally addressable, calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
 5. Switches: Self-configuring, digitally addressable pushbutton on/off, dimming, and scene switches with two-way active infrared (IR) communications.
 6. Daylighting Sensors: Single-zone closed loop daylighting sensors with two-way active infrared (IR) communications for daylight harvesting using dimming control.
 7. Emergency Lighting Control Unit (ELCU): Allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building.

2.03 ROOM CONTROLLERS (ROOM AND PLUG LOAD CONTROLLERS)

- A. Room Controllers: Each controller shall be designed to be remotely installed and provide 2 or 4 load control relays, 4 independent occupancy sensor/hardwire inputs, 2 or 4 independent 0-10V dimming outputs, 2 photocell head inputs, and a local port for 2 data line push-button switches. The room controllers shall be able to operate as stand-alone devices and do not need to be networked together. Control units include the following features:
 1. Enclosure: Each room controller shall be provided with a NEMA 1 enclosure with a removable screw cover. Two-load room controllers shall also be provided with a 3/4-inch nipple for mounting directly onto a junction box.
 2. Control Voltage: The room controller shall be available with 120/277VAC.
 3. Relays: Each controller shall be provided with 2 or 4 single pole relays de-rated to 30A tungsten or ballast loads at up to 347VAC.
 4. Connections: Each controller shall be provided with 6-inch color coded wire leads for terminating the high voltage connections. It shall also be provided with RJ45 connectors for the data line connections and push-to-connect connectors for occupancy sensors, dimming, and photocells.
 5. Occupancy Sensor Inputs: Each room controller shall provide 4 hardwire inputs that can directly interface occupancy sensors or hardwired switches. Each room controller shall provide up to 200mA @ 24VDC total power for the occupancy sensor.

6. Photocell Inputs: It shall provide an interface for up to 2 photocell heads.
 7. Local Data Line Port: Shall provide an RJ45 data line port for up to two (2) 6 push-button switches.
 8. Dimming: Room controllers shall be provided with 2 independent 0-10V dimming ballast control outputs that shall sink a maximum of 100mA per output.
 9. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of utility power:
 - a. Turn On to 100 percent.
 - b. Turn Off.
 - c. Turn On to last level.
 10. Each load shall be configurable to operate in the following sequences based on occupancy:
 - a. Auto On to 50% / Auto Off
 - b. Manual On / Auto Off
 11. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.
- 2.04 INDOOR, LOW-VOLTAGE, CEILING-MOUNTED OCCUPANCY SENSORS
- A. Basis-of-Design Product: Subject to compliance with requirements, provide Intelligent Lighting Controls #SWX-2 series or comparable product by one of the following:
 1. Acuity Brands.
 2. Lutron Electronics Co., Inc.
 - B. General Requirements for Sensors: Ceiling-mounted, solid-state indoor occupancy sensors.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
 3. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Power Pack Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 4. Indicator: LED indicator on sensor to show when motion is detected during testing and normal operation of sensor.
 5. Automatic Light-Level Sensor: Adjustable from 10 to 300 fc; turn lights off when selected lighting level is present.
 6. Manual On Function: Sensor shall have a manual on function that is facilitated by a low-voltage momentary switch.
 - C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and overlapping passive acoustic occupancy detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 1. Sensitivity Adjustment: Separate for each sensing technology.
 2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 750 sq. ft. when mounted on a 96-inch- high ceiling.
 - D. Operation:
 1. Occupancy Mode in Corridors: Turn lights on automatically at 100% when covered area is occupied and turn them off automatically when unoccupied.
 2. Occupancy Mode in Classrooms: Turn lights on automatically at 50% when covered area is occupied and turn them off automatically when unoccupied.
 3. Vacancy Mode in Storage Rooms: Turn light on manually when covered area is occupied and turn them off automatically when unoccupied.
 4. Time delay for turning lights off shall be adjustable over a minimum range of 5 to 30 minutes.
- 2.05 INDOOR, LOW-VOLTAGE, WALL-MOUNTED OCCUPANCY SENSORS
- A. Basis-of-Design Product: Subject to compliance with requirements, provide Intelligent Lighting Controls #SWX-4 series or comparable product by one of the following:
 1. Acuity Brands.
 2. Lutron Electronics Co., Inc.
 - B. General Requirements for Sensors: Wall-mounted, solid-state indoor occupancy sensors.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
 3. Mounting:

- a. Sensor: Swivel mounting bracket attached to sensor allows sensor to be angled for wall or ceiling mounting on a standard outlet box.
 - b. Power Pack Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 - 4. Indicator: LED indicator on sensor to show when motion is detected during testing and normal operation of sensor.
 - 5. Automatic Light-Level Sensor: Adjustable from 10 to 300 fc; turn lights off when selected lighting level is present.
 - C. Dual-Technology Type: Wall-mounted; detect occupants in coverage area using PIR and overlapping passive acoustic occupancy detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
 - 1. Sensitivity Adjustment: Separate for each sensing technology.
 - 2. Detection Coverage (Standard Room): Detect walking motion occupancy anywhere within a circular area of 2000 sq. ft. and desktop motion within a circular area of 1000 sq. ft. when mounted at 10-foot above floor.
 - D. Operation:
 - 1. Occupancy Mode in Corridors: Turn lights on automatically at 100% when covered area is occupied and turn them off automatically when unoccupied.
 - 2. Time delay for turning lights off shall be adjustable over a minimum range of 5 to 30 minutes.
- 2.06 LOW-VOLTAGE, MOMENTARY SWITCHES
 - A. Basis-of-Design Product: Subject to compliance with requirements, provide Intelligent Lighting Controls #LS-G3 series or comparable product by one of the following:
 - 1. Acuity Brands.
 - 2. Lutron Electronics Co., Inc.
 - B. General Description:
 - 1. Decorator styling compatible with screwless or standard wall plates.
 - 2. Internal green LED which can function as either a locator or pilot light, depending upon application and how the switch is wired.
 - 3. When top of switch is pressed, an internal contact between an on and common terminal is made, when bottom of switch is pressed, an internal contact between an off and common terminal is made.
 - C. Wall Plate: Comply with wall plate requirements in Division 26 Section "Wiring Devices".
 - D. Finish: Comply with finishes requirements in Division 26 Section "Wiring Devices".
- 2.07 DAYLIGHT SENSORS
 - A. Daylighting sensors shall work with load controllers and relay panels to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to the controller or panel. Daylighting sensors shall be interchangeable without the need for rewiring.
 - 1. Closed loop sensors measure the ambient light in the space and control a single lighting zone.
 - B. Digital daylight sensors include the following features:
 - 1. An internal photodiode that measures lightwaves within the visible spectrum and has a response curve that closely matches the photopic curve.
 - 2. Sensor light level range shall be from 1-6,553 foot-candles (fc).
 - 3. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.
 - 4. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.
 - 5. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
 - 6. Configuration LED status light on device that blinks to indicate data transmission.
 - 7. One RJ45 port for connection to Room Controller local network.
 - 8. Status LED indicates test mode, override mode and load binding.
 - 9. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.
 - C. Closed loop digital daylight sensor includes the following additional features:
 - 1. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.
 - 2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
 - 3. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.

2.08 EMERGENCY LIGHTING CONTROL DEVICES

- A. Emergency Power Control – A UL 924 listed device installs down line of an output that monitors a switched or dimmed circuit providing normal lighting to an area. The unit provides normal ON/OFF or 0-10V dimming control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
 1. 120/277 volts, 50/60 Hz., 20 amp ballast rating.
 2. Push to test button.
 3. Auxiliary contact for remote test or fire alarm system interface

2.09 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Intelligent Lighting Controls #ILC-SWX series or comparable product by one of the following:
 1. Acuity Brands.
 2. Lutron Electronics Co., Inc.
- B. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual technology.
 1. Connections: Hard wired, line-voltage.
 2. Rated 1200 W at 277 VAC for LED lighting, and ¼ hp at 120 VAC.
 3. Adjustable time delay of 15 minutes.
 4. Able to be locked to Manual-On mode.
 5. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc
 6. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- C. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.
 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
- D. Finishes, including device color, wall plate and lettering: Comply with Division 26 Section "Wiring Devices."
- E. Wall Plates: Comply with wall plate requirements in Division 26 Section "Wiring Devices."

2.10 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ABB/General Electric Company; GE Consumer & Industrial – Electrical Distribution; Total Lighting Control.
 2. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 3. Square D; a brand of Schneider Electric.
- B. Description: Electrically operated and mechanically held, combination-type lighting contactors with non-fused disconnect, complying with NEMA ICS 2 and UL 508.
 1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.
- C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
 1. Monitoring: On-off status.
 2. Control: On-off operation.

2.11 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panels according to NECA 407.
- B. Examine elements and surfaces to receive room controllers for compliance with installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
- C. Switchbox mounted sensors:
 - 1. Set field selectable sensors to automatic "on" automatic "off" for all devices indicated to be Occupancy sensors on the Drawings. Set all other sensors to field selectable manual "on".
 - 2. Comply with installation and connection requirements in Division 26 Section "Wiring Devices."

3.03 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- E. General Requirements:
 - 1. All cabling shall be plenum rated cable for all plenum areas.
 - 2. It is permissible to install cabling exposed (without conduit) in areas above lay-in ceilings. All other low voltage cabling shall be installed in conduit. This includes but is not limited to mechanical rooms, areas without lay-in style ceilings, areas with hard (non-removable) ceilings, etc.
 - 3. All cabling installed exposed shall be installed in J-hooks. It is not acceptable to "tie-wrap" cables to structural building members, install cables unsupported, or to install cable through structural members as a means of support. Cables shall also be installed in a neat and orderly manner. Cable shall be installed at angles parallel or perpendicular to structural members. Diagonal or "shortest path" installations of cable is not acceptable.
 - 4. Conduits ends shall include bushings for protection of the cable(s) entering or leaving the conduit when transitioning from areas requiring installation in conduit to areas that do not require conduit installation.

3.04 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label contactors with a unique designation.
- C. Provide self-adhesive label on ceiling or ceiling grid below each local room controller to identify the specific module mounted above ceiling. Provide unique naming convention for each local room controller. Provide same label to room controller itself.

3.05 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.06 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.

3.07 ADJUSTING

- A. Time-Schedule Adjustments: Times indicated in documents represent initial settings known at time of design documentation. Coordinate final program settings for time-of-day and holiday schedules with Owner prior to Substantial Completion. When requested within 3 months of date of Substantial Completion, provide on-site assistance in adjust schedules to suit Owner. Provide up to one visit to Project during other-than-normal occupancy hours for this purpose.
- B. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
 - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

3.08 COMMISSIONING

- A. Upon completion of the installation, the system shall be commissioned by both the manufacturer's factory authorized representative who will verify a complete fully functional system as well as the Project's Commissioning Agent.
- B. The electrical contractor shall provide both the manufacturer and the electrical engineer with twenty-one working days written notice of the system startup and adjustment date.
- C. Upon completion of the system commissioning, the factory-authorized technician shall provide the proper training to the Owner's personnel on the adjustment and maintenance of the system.

3.09 CLEANING

- A. Clean components according to manufacturer's written instructions.
- B. On completion of device box installation but before any wiring devices are installed, inspect interior of boxes and perform the following:
 - 1. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
- C. On completion of wall plate installation, inspect exterior surfaces and perform the following:
 - 1. Remove paint splatters and other spots.
 - 2. Replace cracked or damaged wall plates.
 - 3. Wipe down all wall plates with approved cleaning agent to remove fingerprints and dust.

END OF SECTION 26 09 23

SECTION 26 22 00 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following types of high efficiency, dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:
 - 1. Distribution transformers.

1.02 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals".
- C. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.
 - 1. Include typical manufacturer's test data reports for each type and size transformer. Reports shall include but not be limited to the following data:
 - a. Efficiency in accordance with DOE 2016 Efficiency.
 - b. Efficiency at 15-, 25-, 35-, 50-, 65-, 75-percent and 100-percent load under linear load.
 - c. Percent voltage regulation at 80-percent and 100-percent power factor.
 - d. Losses in VA at no load and full load conditions.
 - e. Percent X and Percent R values,
 - f. Maximum sound level of transformer in enclosure (in dBA).
 - g. Maximum 30-Deg hot spot and average temperature rise over a 40-degree C ambient.
- D. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- E. Warranty: Copy of special warranty specified in this Section.

1.03 INFORMATIONAL SUBMITTALS

- A. Source quality-control test reports.
- B. Field quality-control test reports.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.
- B. Warranty: Copy of special warranty.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain each transformer type through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Prepare equipment for shipment.
 - 1. Provide suitable crating, blocking, and supports so equipment will withstand expected domestic shipping and handling shocks and vibration.
 - 2. Weatherproof equipment for shipment. Close connection openings to prevent entrance of foreign material during shipment and storage.
- B. Installation Pathway: Coordinate delivery of equipment to allow movement into designated space.
 - 1. Deliver in shipping splits in sizes that can be moved past obstructions in delivery path.
 - 2. Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving equipment into place.
- C. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
- D. Store equipment indoors in clean dry space with uniform temperature in accordance with manufacturer's requirements to prevent condensation. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- E. Handle equipment components according to manufacturer's written instructions. Use factory-installed lifting provisions.

- 1.07 COORDINATION
 - A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
 - B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.
- 1.08 WARRANTY
 - A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of transformers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Twenty (20) year pro-rated warranty from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS
 - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 2. Siemens Energy & Automation, Inc.
 - 3. Square D; a brand of Schneider Electric.
- 2.02 GENERAL TRANSFORMER REQUIREMENTS
 - A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - C. Transformers Rated 15 kVA and Larger:
 - 1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
 - 2. Marked as compliant with DOE 2016 efficiency levels by an NRTL.
 - D. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."
- 2.03 DISTRIBUTION TRANSFORMERS
 - A. Comply with NEMA ST 20, and list and label as complying with UL 1561.
 - B. Cores: Electrical grade, non-aging, silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below saturation to allow for a minimum of 10% over voltage excitation. The cores shall be clamped with structural angles (formed angles not acceptable) and bolted to the enclosure to prevent damage during shipment or rough handling.
 - 1. One leg per phase.
 - 2. Core volume shall allow efficient transformer operation at 10 percent above the nominal tap voltage.
 - 3. Grounded to enclosure; the core and coils shall be visibly grounded to the frame of the transformer cubicle by means of a flexible grounding strap of adequate size.
 - C. Coils: Continuous windings without splices except for taps.
 - 1. Coil Material: Copper.
 - 2. Internal Coil Connections: Brazed or pressure type.
 - 3. Terminal Connections: Welded.
 - 4. Vacuum impregnated with non-hygroscopic, thermosetting varnish.
 - 5. Each layer shall have end fillers or tie downs to provide maximum mechanical strength.
 - 6. Materials incorporated must have at least a minimum of one year of proven field usage. Accelerated laboratory tests not acceptable in lieu of this field usage.
 - 7. Provide final wrap of electrical insulating material to prevent injury to the magnet wire. Transformers having coils with magnet wire visible will not be acceptable.
 - D. Encapsulation: Transformers smaller than 30 kVA shall have core and coils completely resin encapsulated.
 - E. Enclosure for Interior Transformers: Ventilated, NEMA 250, Type 2.
 - 1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
 - 2. Core and coil unit shall be completely isolated from the enclosure by means of a vibration isolating system and shall be so designed as to provide for continual securement of the core and coil unit to the enclosure.
 - 3. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 - 4. Wiring Compartment: Sized for conduit entry and wiring installation.
 - F. Transformer Enclosure Finish: Comply with NEMA 250. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning and phosphatizing, followed by electrostatic deposition of a polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces.
 - 1. Finish Color: Gray weather-resistant enamel.
 - G. Taps for Transformers Smaller Than 3 kVA: None.
 - H. Taps for Transformers 7.5 to 14 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.
 - I. Taps for Transformers 15 kVA and Larger: Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity.

- J. Insulation Class, Smaller Than 30 kVA: 180 deg C, UL-component-recognized insulation system with a maximum of 130 deg C rise above 40 deg C ambient temperature.
- K. Insulation Class, 30 kVA and Larger: 220 deg C, UL-component-recognized insulation system with a maximum of 130 deg C rise above 40 deg C ambient temperature.
- L. The maximum top of case temperature shall not exceed 35 deg C above ambient.
- M. Grounding: Provide ground bar kit or a ground bar installed on the inside of the transformer enclosure.
- N. K-Factor Rating: Transformers shall be K-13 rated and shall comply with UL 1561 requirements for non-sinusoidal load current-handling capability to the degree defined by designated K-factor.
 - 1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor, without exceeding the indicated insulation class in a 40 deg C maximum ambient and a 24-hour average ambient of 30 deg C.
 - 2. Indicate value of K-factor on transformer nameplate.
 - 3. Construct K-rated transformers in accordance with requirements of Distribution Transformers listed above, unless otherwise indicated.
 - 4. Unit shall comply with requirements of DOE 2016 efficiency levels when tested according to NEMA TP2 with a K-factor equal to one.
- O. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.
 - 1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
 - 2. Include special terminal for grounding the shield.
- P. Neutral: Rated 200 percent of full load current for K-factor-rated transformers.
- Q. Impedance: Between 3.5% and 5.8% unless otherwise noted.
- R. Zero Sequence Impedance/Reactance: Less than 0.95% and 0.3% respectively.
- S. Wall Brackets: Manufacturer's standard brackets.
- T. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:
 - 1. 9 kVA and Less: 40 dBA
 - 2. 10 to 45 kVA: 42 dBA
 - 3. 46 to 150 kVA: 45 dBA
 - 4. 151 to 300 kVA: 50 dBA
 - 5. 301 to 500 kVA: 54 dBA
 - 6. 501 to 750 kVA: 57 dBA
 - 7. 751 to 1000 kVA: 59 dBA

2.04 IDENTIFICATION DEVICES

- A. Nameplates: Engraved, laminated-plastic or metal nameplate for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Identification for Electrical Systems."

2.05 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.
 - 1. Resistance measurements of all windings at rated voltage connections and at all tap connections.
 - 2. Ratio tests at rated voltage connections and at all tap connections.
 - 3. Phase relation and polarity tests at rated voltage connections.
 - 4. No load losses, and excitation current and rated voltage at rated voltage connections.
 - 5. Impedance and load losses at rated current and rated frequency at rated voltage connections.
 - 6. Applied and induced tensile tests.
 - 7. Regulation and efficiency at rated load and voltage.
 - 8. Insulation-Resistance Tests:
 - a. High-voltage to ground.
 - b. Low-voltage to ground.
 - c. High-voltage to low-voltage.
 - 9. Temperature tests.
- B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

- D. Verify that ground connections are in place and requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
 - E. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 APPLICATION
- A. Transformer Mounting
 - 1. 15 kVA or less: Floor mounted or suspended, as indicated.
 - 2. 30 kVA and 45kVA: floor mounted, rack mounted or suspended, as indicated.
 - 3. 75 kVA: Floor mounted or rack mounted, as indicated.
 - 4. Greater than 75 kVA: Floor mounted or rack mounted, unless otherwise indicated.
- 3.03 INSTALLATION
- A. Comply with NECA 409, "Recommended Practice for Installing and Maintaining Dry-Type Transformers" as published by the National Electrical Contractors Association.
 - B. Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - 1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
 - C. Install transformer level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.
 - D. Construct concrete bases and anchor floor-mounting transformers level on concrete bases, 4-inch nominal thickness according to manufacturer's written instructions and requirements in Division 26 Section "Hangers and Supports for Electrical Systems." Concrete materials and installation requirements are specified in Division 3.
 - E. Construction steel channel support system for rack-mounted or suspended transformers according to manufacturer's written instruction and requirements of Division 26 Section "Hangers and Supports for Electrical Systems."
 - F. Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
 - G. Remove shipping bolts, blocking, and wedges.
- 3.04 IDENTIFICATION
- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."
 - B. Transformer Nameplates: Label each transformer with Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Identification for Electrical Systems."
- 3.05 CONNECTIONS
- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
 - C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
 - D. Provide flexible metal conduit with a minimum 12-inch to a maximum 24-inch length for wiring connections to transformer enclosure.
- 3.06 FIELD QUALITY CONTROL
- A. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - C. Remove and replace units that do not pass tests or inspections and retest as specified above.
 - D. Infrared Scanning: Two months after Substantial Completion, perform an infrared scan of transformer connections.
 - 1. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
 - 2. Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.
 - E. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each transformer 11 months after date of Substantial Completion.
 - F. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.
- 3.07 ADJUSTING
- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.08 CLEANING

A. Clean components according to manufacturer's written instructions.

B. On completion of installation, inspect interior and exterior surfaces and perform the following:

1. Remove paint splatters and other spots.
2. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
3. Repair exposed surfaces to match original finish.

3.09 PROTECTION

A. Temporary Heating: Maintain a clean dry space with uniform temperature in accordance with manufacturer's requirements to prevent condensation. Apply temporary heating as required.

B. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.

END OF SECTION 26 22 00

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.
- B. Related Sections include the following:
 - 1. Division 26 Section "Overcurrent Protective Device Studies" for short-circuit rating of devices and for setting of overcurrent protective devices.
 - 2. Division 26 Section "SPD for Low-Voltage Electrical Power Circuits" for surge protective devices.

1.02 DEFINITIONS

- A. DPM: Multi-function Digital-Metering Monitor.
- B. EMI: Electromagnetic Interference.
- C. GFCI: Ground-fault circuit interrupter.
- D. GFEP: Ground-fault equipment protection.
- E. MCCB: Molded-case circuit breaker.
- F. RFI: Radio-frequency interference.
- G. RMS: Root mean square.
- H. SPD: Surge protective device.
- I. SPDT: Single pole, double throw.
- J. SVR: Suppressed voltage rating.
- K. VPR: Voltage protection rating.

1.03 PERFORMANCE REQUIREMENTS

- A. Overcurrent Protective Device Coordination for Emergency Systems and Legally Required Standby Systems: All overcurrent protective devices proposed for inclusion in the Work on the Emergency Systems branch and the Legally Required Standby System branch shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for both normal and emergency power. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.
- B. Overcurrent Protective Device Coordination: All other overcurrent protective devices proposed for inclusion in the Work shall be selected to be coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power to 0.10 seconds. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.

1.04 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals."
- C. Simultaneous Action Submittals: Panelboard Product Data submittal shall be made in conjunction with action submittals required under Division 26 Section "Overcurrent Protective Device Studies." The release of electrical equipment submittals (panelboards, engine generators, switchboard, etc.) is dependent on the receipt of a complete and accurate overcurrent protective device coordination study. The Architect and Engineer require a full submittal review period as delineated in Division 01 Section "Submittal Procedures" to adequately review the OCPD study against the submitted electrical components prior to release of submittals for equipment procurement. The submittal schedule required by Division 01 requirements shall provide for this review time in the action submittal process. Delay claims arising due to Contractor's failure to coordinate simultaneous action submittals will not be considered by the Owner.
- D. Product Data: For each type of panelboard, switching and overcurrent protective device, accessory, and related component, include the following:
 - 1. Manufacturer's dimensions and technical data on features, performance, electrical characteristics, ratings, and finishes.
 - 2. Related capacities, features, operating characteristics, furnished specialties, factory settings, accessories and time-current characteristic curves for individual relays and overcurrent protective devices.

- a. Time-current curves for each type of overcurrent protection device. Include hardcopy of characteristic curve and TCC Number for use with Power Tools by SKM Systems Analysis, Inc. Indicate available setting points and selectable ranges for each type of adjustable overcurrent protection device.
 - E. Shop Drawings: For each panelboard and related equipment, include the following:
 - 1. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show method of field assembly and location and size of each field connection. Include the following:
 - a. Tabulation of installed devices, equipment features, and ratings.
 - b. Enclosure types and details for types other than NEMA 250, Type 1.
 - c. Outline and general arrangement drawing showing dimensions, shipping sections, and weights of each assembled section.
 - d. Bus configuration with size and number of conductors in each bus run, including phase, neutral, and ground conductors of main and branch buses.
 - e. Bus current and voltage ratings.
 - f. One-line diagram.
 - g. Short-circuit current rating of panelboards and overcurrent protective devices.
 - h. Feeder entry locations and lug configuration.
 - i. Elevation drawing showing locations for anchor bolts.
 - j. Nameplate legends.
 - 2. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 3. Wiring diagrams: For each type of panelboard and related equipment, include power, signal, and control wiring.
 - F. Warranty: Special warranty specified in this Section.
- 1.05 INFORMATIONAL SUBMITTALS
 - A. Qualification Data: For qualified installer.
 - B. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
 - C. Panelboard Schedules: For installation in panelboards.
- 1.06 CLOSEOUT SUBMITTALS
 - A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - 2. Manufacturer's routing maintenance requirements for panelboard and all installed components.
 - 3. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.
 - 4. Manufacturer's sample system checklists and log sheets.
- 1.07 QUALITY ASSURANCE
 - A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer, unless otherwise indicated.
 - 1. Breaker Manufacturer: Manufacturer for breakers shall be the same as the manufacturer of other breakers proposed for other portions of the Work.
 - B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - D. Comply with NEMA PB 1.
 - E. Comply with NFPA 70.
- 1.08 DELIVERY, STORAGE, AND HANDLING
 - A. Remove loose packing and flammable materials from inside panelboards.
 - B. Handle and prepare panelboards for installation according to NEMA PB 1.
 - C. Handle equipment components according to manufacturer's written instructions. Use factory-installed lifting provisions.
 - D. Prepare equipment for shipment.
 - 1. Provide suitable crating, blocking, and supports so equipment will withstand expected domestic shipping and handling shocks and vibration.
 - 2. Weatherproof equipment for shipment. Close connection openings to prevent entrance of foreign material during shipment and storage.
 - E. Installation Pathway: Coordinate delivery of equipment to allow movement into designated space.

1. Deliver in shipping splits in sizes that can be moved past obstructions in delivery path.
 2. Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving equipment into place.
- F. Store equipment indoors in clean dry space with uniform temperature in accordance with manufacturer's requirements to prevent condensation. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- 1.09 PROJECT CONDITIONS
- A. Environmental Limitations:
1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.
 - b. Altitude: Not exceeding 6600 feet.
- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
1. Ambient temperatures within limits specified.
 2. Altitude not exceeding 6600 feet.
- 1.10 COORDINATION
- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- 1.11 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace panelboard devices that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 2. Siemens Energy & Automation, Inc.
 3. Square D; Schneider Electric.

2.02 RATINGS

- A. Suitable for application in 3-phase, 60-Hz, solidly grounded-neutral system, unless otherwise indicated.
- B. Nominal System Voltage: As indicated on the Drawings.
- C. Main-Bus: Amperage as indicated on the Drawings. Provide continuous rating across entire length of main-bus.
- D. Short-Time and Short-Circuit Current: Match rating of highest-rated overcurrent protective device in panelboard assembly.
1. Available Short-Circuit Current: As indicated on the Drawings. Refer to Division 26 Section "Overcurrent Protective Device Coordination Study" for additional requirements.

2.03 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Mounting height of breakers shall be in accordance with NFPA 70 requirements. Fabrication of equipment shall take housekeeping pad dimension into account in determining height of top breaker in all sections. Refer to Division 26 Section "Hangers and Supports for Electrical Systems" for housekeeping pad specifications.
- B. Enclosures: Surface-mounted cabinets.
1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 2. Height: 84-inches maximum.
 3. Front Cover: Provide the following, unless otherwise indicated:
 - a. Hinged Front Cover: Door-in-Door construction with entire front trim hinged to box and with standard door within hinged trim cover to access device handles.
 4. Finishes:
 - a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - b. Back Boxes: Galvanized steel.

5. Directory Card: Inside panelboard door, mounted in transparent card holder.
 - C. Incoming Mains Location: Top and bottom.
 - D. Phase, Neutral, and Ground Buses:
 1. Material: Hard-drawn copper, 98 percent conductivity.
 - a. Plating shall run entire length of bus.
 - b. Bus shall be fully rated the entire length.
 2. Panelboard interior assembly shall be dead front with panelboard front removed. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
 5. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled by an NRTL acceptable to authority having jurisdiction, as suitable for nonlinear loads in electronic-grade panelboards served from K-rated or harmonic-mitigating transformers. Connectors shall be sized for double-sized or parallel conductors as indicated on Drawings. Do not mount neutral bus in gutter.
 - E. Conductor Connectors: Suitable for use with conductor material and sizes.
 1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Terminations shall allow use of 75 deg C rated conductors without derating.
 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 4. Main and Neutral Lugs: Compression type, with a lug on the neutral bar for each pole in the panelboard.
 5. Ground Lugs and Bus-Configured Terminators: Compression type, with a lug on the bar for each pole in the panelboard.
 6. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
 - F. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
 1. Percentage of Future Space Capacity: Ten percent.
 - G. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50 deg C rise above ambient. Heat rise tests shall be conducted in accordance with UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests.
- 2.04 DISTRIBUTION PANELBOARDS
- A. Panelboards: NEMA PB 1, power and feeder distribution type.
 - B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 1. For doors more than 48 inches high, provide two latches, keyed alike.
 - C. Main Overcurrent Protection Device Type: Circuit breaker.
 1. Main OCPD rated less than 250 Amps: Thermal-Magnetic Circuit Breakers.
 2. Main OCPD rated 250 Amps and greater: Electronic Trip-Unit Circuit Breakers.
 3. Main OCPD for Emergency Systems or Legally Required Standby Systems: Electronic Trip-Unit Circuit Breakers.
 - D. Feeder Overcurrent Protection Device Type: Provide overcurrent device as follows, unless otherwise indicated: Circuit breaker.
 1. Feeder OCPD rated less than 250 Amps: Thermal-Magnetic; Bolt-on circuit breakers.
 2. Feeder OCPD rated 250 Amps and greater: Thermal-Magnetic; Bolt-on circuit breakers or plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
 3. Feeder OCPD for Emergency Systems or Legally Required Standby Systems: Electronic Trip-Unit Circuit Breakers.
 - E. Branch Overcurrent Protection Device Type: Provide overcurrent device as follows, unless otherwise indicated: Circuit breaker.
 1. Branch OCPD rated less than 125 Amps: Bolt-on Thermal-Magnetic circuit breakers.
 2. Branch OCPD rated 125 Amps and Greater: Bolt-on Thermal-Magnetic circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
 - F. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF". Provisions for additional breakers shall be such that no additional connectors will be required to add breakers.

- G. Surge Protection Device: Where indicated on Drawings. IEEE C62.41-compliant, externally mounted, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, short-circuit current rating complying with UL 1449, second edition, and matching or exceeding the panelboard short-circuit rating, redundant suppression circuits, with individually fused metal-oxide varistors.
- 2.05 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS
- A. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type. Panelboards shall be of the dead-front, quick-make, quick-break, bolt-on circuit breaker type.
 - B. Main Overcurrent Protection Device Type: Circuit breaker or lugs only.
 - 1. Main OCPD rated less than 250 Amps: Thermal-Magnetic Circuit Breakers.
 - 2. Main OCPD rated 250 Amps and Greater: Thermal-Magnetic Circuit Breakers.
 - 3. Main OCPD for Emergency Systems or Legally Required Standby Systems: Electronic Trip-Unit Circuit Breakers.
 - C. Branch Overcurrent Protective Devices: Thermal-Magnetic; Bolt-on circuit breakers, replaceable without disturbing adjacent units.
 - D. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
 - E. Surge Protection Device: Where indicated on Drawings. IEEE C62.41-compliant, externally mounted, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking suppression and filtering modules, short-circuit current rating complying with UL 1449, second edition, and matching or exceeding the panelboard short-circuit rating, redundant suppression circuits, with individually fused metal-oxide varistors.
- 2.06 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES
- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
 - 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 2. Electronic Trip Circuit Breakers: RMS sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response, where indicated.
 - 3. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip). Provide as indicated and as required by NFPA 70 for personnel protection.
 - 4. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration. Provide as indicated and as required by NFPA 70 for personnel protection.
 - 5. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - f. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 - g. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
 - h. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
 - i. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in off position.
 - j. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
- 2.07 IDENTIFICATION
- A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
 - B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
 - C. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic cover.
 - 1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.
- 2.08 ACCESSORY COMPONENTS AND FEATURES
- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
 - B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Examine roughing-in of conduits to verify the following:
 - 1. Wiring entries comply with layout requirements.
 - 2. Entries are within conduit-entry tolerances specified by manufacturer and no feeders will have to cross section barriers to reach load or line lugs.
- E. Verify that ground connections are in place and that requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Panelboards with circuit breakers installed before the building has been completed and cleaned shall be masked.
- C. Equipment Mounting: Install panelboards on concrete bases, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-Place Concrete."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to panelboards.
 - 5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- E. Mount top of trim 74 inches above finished floor unless otherwise indicated. Panelboards of extra height shall be installed at least 18 inches above floor.
- F. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- G. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- H. Install filler plates in unused spaces.
- I. For Recessed Panels: Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade. Paint trim to match wall.
- J. Arrange conductors in gutters into groups and bundle and wrap with wire ties. All wiring shall be properly formed; no splices are permitted in gutters.
- K. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."
- B. Panelboard Directory: Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. A directory of each panelboard shall be completed and available for review by Engineer during final punch list inspection. Provide description of load and location (i.e. "Lighting, East Wall, Room 101").
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.04 CONNECTIONS

- A. Tighten bus joints, electrical connectors, and terminals according to manufacturer's published torque-tightening values.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- 3.05 FIELD QUALITY CONTROL
- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
 - C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - D. Panelboards will be considered defective if they do not pass tests and inspections.
 - E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- 3.06 ADJUSTING
- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
 - B. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study."
- 3.07 CLEANING
- A. Clean components according to manufacturer's written instructions.
 - B. All dust and debris shall be removed from the panels before they are energized and placed into service.
 - C. All panelboard fronts shall be omitted until final punch list inspection is conducted. Prior to installation of front trim and cover plates inspect interior surfaces and perform the following:
 - 1. Remove paint splatters and other spots.
 - 2. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
 - D. On completion of front trim and cover installation, inspect exterior surfaces and perform the following:
 - 1. Remove paint splatters and other spots.
 - 2. Remove all temporary markings and labels.
 - 3. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
 - E. Repair exposed surfaces to match original finish.
- 3.08 PROTECTION
- A. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, receptacles with integral USB, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Weather-resistant receptacles.
 - 4. Snap switches.
 - 5. Wall plates.
 - 6. Floor service outlets.
- B. Related Requirements:
 - 1. Division 26 Section "Lighting Control Devices" for occupancy and vacancy sensor light switches.

1.02 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. SPD: Surge protective device.
- F. UTP: Unshielded twisted pair.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.04 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For each type of product.
- C. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

1.05 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 2. Leviton Mfg. Company Inc. (Leviton).
 - 3. Pass & Seymour/Legrand (Legrand).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.02 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

2.03 STRAIGHT-BLADE RECEPTACLES

- A. Tamper Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; BR20xTR (duplex).
 - b. Leviton; 5362-SGx (duplex).
 - c. Legrand; TR5362-x (duplex).

- 2.04 USB CHARGER DEVICES
- A. Tamper-Resistant, USB Charger Receptacles: 12 V dc, 2.0 A, USB Type A; comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, UL 1310, and FS W-C-596.
1. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
 2. USB Receptacles with Line Voltage Receptacles: Dual, Type A USB with dual, two-pole, three-wire, and self-grounding.
 3. USB Receptacles Stand-Alone: Quad, Type A.
- 2.05 GFCI RECEPTACLES
- A. General Description:
1. Straight blade, feed-through type.
 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Tamper-Resistant, Duplex GFCI Convenience Receptacles, 125 V, 20 A:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; GFTR20x.
 - b. Leviton; GFWT2-x.
 - c. Legrand; 2097TRWRx.
- 2.06 TWIST-LOCKING RECEPTACLES
- A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-20R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; HBL2310.
 - b. Leviton; 2310.
 - c. Legrand; L520R.
- B. Single Convenience Receptacles, 125 V, 30 A: Comply with NEMA WD 1, NEMA WD 6 Configuration L5-30R, and UL 498.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; HBL2610.
 - b. Leviton; 2610.
 - c. Legrand; L530R.
- 2.07 CORD AND PLUG SETS
- A. Description:
1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
 2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
 3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.
- 2.08 TOGGLE SWITCHES
- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Single Pole:
 - 1) Hubbell; HBL1221x.
 - 2) Leviton; 1221-2x.
 - 3) Legrand; PS20AC1x.
 - b. Two Pole:
 - 1) Hubbell; HBL1222x.
 - 2) Leviton; 1222-2x.
 - 3) Legrand; PS20AC2x.
 - c. Three Way:
 - 1) Hubbell; HBL1223x.
 - 2) Leviton; 1223-2x.
 - 3) Legrand; PS20AC3x.
 - d. Four Way:
 - 1) Hubbell; HBL1224x.
 - 2) Leviton; 1224-2x.
 - 3) Legrand; PS20AC4x.
- C. Key-Operated Switches, 120/277 V, 20 A:
1. Description: Single pole, keyed override switches shall have full size key cylinders that can utilize district standard key way locks. Coordinate with Owner for key way type.

- D. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches: 120/277 V, 20 A; for use with mechanically held lighting contactors.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Hubbell; HBL1557x.
 - b. Leviton; 1257x.
 - c. Legrand; 1251x.

2.09 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: 0.035-inch- thick, satin-finished, Type 302 stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.10 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: Gray unless otherwise indicated or required by NFPA 70 or device listing.
 - 2. Wiring Devices Connected to Emergency Power System: Red.
 - 3. Isolated Ground Receptacles: Orange.
 - 4. Controlled Receptacles: Green.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - 8. Tighten unused terminal screws on the device.
 - 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- E. Receptacle Orientation:
 - 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
- F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- G. Dimmers:

1. Install dimmers within terms of their listing.
 2. Verify that dimmers used for fan speed control are listed for that application.
 3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
- H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.
- I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- 3.02 GFCI RECEPTACLES
- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.
- 3.03 IDENTIFICATION
- A. Comply with Division 26 Section "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. For devices located within 6-foot of sink, use engraved machine printing with black-filled lettering on face of plate and durable wire markers or tags inside outlet boxes. For all other devices, use clear self-adhesive label with black lettering on face of plate and durable wire markers or tags inside outlet boxes.
- 3.04 FIELD QUALITY CONTROL
- A. Perform the following tests and inspections:
1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Convenience Receptacles:
1. Line Voltage: Acceptable range is 114 to 126 V.
 2. Percent Voltage Drop under 15-A Load: A value of 5 percent or higher is unacceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- C. Wiring device will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 26 27 26

SECTION 26 28 13 - FUSES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, and enclosed controllers.
2. Spare-fuse cabinets.

1.02 PERFORMANCE REQUIREMENTS

- A. Overcurrent Protective Device Coordination for Emergency Systems and Legally Required Standby Systems: All overcurrent protective devices proposed for inclusion in the Work on the Emergency Systems branch and the Legally Required Standby System branch shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for both normal and emergency power. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.
- B. Overcurrent Protective Device Coordination: All other overcurrent protective devices proposed for inclusion in the Work shall be selected to be coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power to 0.10 seconds. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.

1.03 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals."
- C. Simultaneous Action Submittals: Fuse Product Data submittal shall be made in conjunction with action submittals required under Division 26 Section "Overcurrent Protective Device Studies." The release of electrical equipment submittals (panelboards, switchboard, etc.) is dependent on the receipt of a complete and accurate overcurrent protective device coordination study. The Architect and Engineer require a full submittal review period as delineated in Division 01 Section "Submittal Procedures" to adequately review the OCPD study against the submitted electrical components prior to release of submittals for equipment procurement. The submittal schedule required by Division 01 requirements shall provide for this review time in the action submittal process. Delay claims arising due to Contractor's failure to coordinate simultaneous action submittals will not be considered by the Owner.
- D. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
 2. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 3. Current-limitation curves for fuses with current-limiting characteristics.
 4. Time-current curves, coordination charts and tables, and related data. Include hardcopy of characteristic curve and TCC Number for use with Power Tools by SKM Systems Analysis, Inc.
 5. Tabulated schedule which indicates type, characteristics, and ratings of individual fuses and lists the devices and equipment in which they will be applied.
 6. Fuse sizes for elevator feeders and elevator disconnect switches.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
1. Ambient temperature adjustment information.
 2. Current-limitation curves for fuses with current-limiting characteristics.
 3. Time-current curves, coordination charts and tables, and related data.

- 1.05 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
- 1.06 QUALITY ASSURANCE
- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - C. Comply with NEMA FU 1 for cartridge fuses.
 - D. Comply with NFPA 70.
 - E. Comply with UL 248-11 for plug fuses.
- 1.07 PROJECT CONDITIONS
- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.
- 1.08 COORDINATION
- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cooper Bussmann, Inc.
 2. Edison Fuse, Inc.
 3. Ferraz Shawmut, Inc.
 4. Littelfuse, Inc.
- 2.02 CARTRIDGE FUSES
- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
- 2.03 SPARE-FUSE CABINET
- A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 2. Finish: Gray, baked enamel.
 3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
 4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.
 5. Manufacturer: Bussmann model SFC or equal.

PART 3 - EXECUTION

- 3.01 EXAMINATION
- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
 - B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
 - C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
 - D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
 - E. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 FUSE APPLICATIONS
- A. Cartridge Fuses:
 1. Service Entrance: Class L, time delay, Bussmann Hi-Cap Time Delay Fuses KRP-C.
 2. Feeders: Class RK1, time delay, Bussmann Low-Peak Dual Element Fuses LPS-RK.
 3. Motor Branch Circuits: Class RK1, time delay, Bussmann Low Peak Dual Element Fuses LPN-RK (250V) or LPS-RK (600V).
 4. Other Branch Circuits: Class RK1, time delay.
 5. Control Circuits: Class CC, fast acting.
- 3.03 INSTALLATION
- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
 - B. Install spare-fuse cabinet(s).

3.04 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.
- B. Install labels indicating Type and Rating of fuse installed on outside of door of each fused switch.

END OF SECTION 26 28 13

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fusible switches.
 - 2. Non-fusible switches.
 - 3. Molded-case circuit breakers (MCCBs).
 - 4. Enclosures.

1.02 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. GFEP: Ground-fault equipment protection.
- C. HD: Heavy duty.
- D. NC: Normally closed.
- E. NO: Normally open.
- F. RMS: Root mean square.
- G. SPDT: Single pole, double throw.

1.03 PERFORMANCE REQUIREMENTS

- A. Overcurrent Protective Device Coordination for Emergency Systems and Legally Required Standby Systems: All overcurrent protective devices proposed for inclusion in the Work on the Emergency Systems branch and the Legally Required Standby System branch shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for both normal and emergency power. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.
- B. Overcurrent Protective Device Coordination: All other overcurrent protective devices proposed for inclusion in the Work shall be selected to be coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power to 0.10 seconds. Refer to Division 26 Section "Overcurrent Protective Device Studies" for additional requirements.

1.04 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals."
- C. Simultaneous Action Submittals: Enclosed Switches and Circuit Breaker Product Data submittal shall be made in conjunction with action submittals required under Division 26 Section "Overcurrent Protective Device Studies." The release of electrical equipment submittals (panelboards, engine generators, switchboard, etc.) is dependent on the receipt of a complete and accurate overcurrent protective device coordination study. The Architect and Engineer require a full submittal review period as delineated in Division 01 Section "Submittal Procedures" to adequately review the OCPD study against the submitted electrical components prior to release of submittals for equipment procurement. The submittal schedule required by Division 01 requirements shall provide for this review time in the action submittal process. Delay claims arising due to Contractor's failure to coordinate simultaneous action submittals will not be considered by the Owner.
- D. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 - 5. Time-current curves for each type of overcurrent protection device. Include hardcopy of characteristic curve and TCC Number for use with Power Tools by SKM Systems Analysis, Inc.
- E. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

- 1. Wiring Diagrams: For power, signal, and control wiring.
- 1.05 INFORMATIONAL SUBMITTALS
 - A. Qualification Data: For qualified testing agency.
 - B. Field quality-control reports.
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
 - C. Manufacturer's field service report.
- 1.06 CLOSEOUT SUBMITTALS
 - A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
 - 1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
 - 2. Manufacturer's routing maintenance requirements for enclosed switches and circuit breakers and all installed components.
 - 3. Time-current curves, including selectable ranges for each type of circuit breaker. Include directory listing each adjustable breaker included in the Work and their final set points.
- 1.07 MAINTENANCE MATERIAL SUBMITTALS
 - A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Fuse Pullers: Two for each size and type.
- 1.08 QUALITY ASSURANCE
 - A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
 - B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
 - C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - D. Comply with NFPA 70.
- 1.09 DELIVERY, STORAGE, AND HANDLING
 - A. Prepare equipment for shipment.
 - 1. Provide suitable crating, blocking, and supports so equipment will withstand expected domestic shipping and handling shocks and vibration.
 - 2. Weatherproof equipment for shipment. Close connection openings to prevent entrance of foreign material during shipment and storage.
 - B. Installation Pathway: Coordinate delivery of equipment to allow movement into designated space.
 - 1. Deliver in shipping splits in sizes that can be moved past obstructions in delivery path.
 - 2. Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving equipment into place.
 - C. Store equipment indoors in clean dry space with uniform temperature in accordance with manufacturer's requirements to prevent condensation. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.
 - D. Handle equipment components according to manufacturer's written instructions. Use factory-installed lifting provisions.
- 1.10 PROJECT CONDITIONS
 - A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.
- 1.11 COORDINATION
 - A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
 - B. Coordinate ratings with utilization equipment nameplate limitations of maximum overcurrent protection device size. Provide enclosed switch or circuit breakers to match utilization equipment requirements.

PART 2 - PRODUCTS

2.01 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 2. Siemens Energy & Automation, Inc.
 3. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 5. Hookstick Handle: Allows use of a hookstick to operate the handle.
 6. Lugs: Compression type, suitable for number, size, and conductor material.
 7. Service-Rated Switches: Labeled for use as service equipment.
 8. Accessory Control Power Voltage: Remote mounted and powered; 120-V ac.
- 2.02 NONFUSIBLE SWITCHES
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 2. Siemens Energy & Automation, Inc.
 3. Square D; a brand of Schneider Electric.
- B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
 4. Hookstick Handle: Allows use of a hookstick to operate the handle.
 5. Lugs: Compression type, suitable for number, size, and conductor material.
 6. Accessory Control Power Voltage: Remote mounted and powered; 120-V ac.
- 2.03 MOLDED-CASE CIRCUIT BREAKERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 2. Siemens Energy & Automation, Inc.
 3. Square D; a brand of Schneider Electric.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:
1. Instantaneous trip.
 2. Long- and short-time pickup levels.
 3. Long- and short-time time adjustments.
 4. Ground-fault pickup level, time delay, and I^2t response.
- E. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip). Provide as indicated and as required by NFPA 70 for personnel protection.
- F. Features and Accessories:
1. Standard frame sizes, trip ratings, and number of poles.
 2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

2.04 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
- B. Enclosure Finish for Outdoor Units: Factory-applied finish in manufacturer's standard ANSI Gray enamel over corrosion-resistant treatment or rust-inhibiting primer coat, undersurfaces treated with corrosion-resistant undercoating.
- C. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard ANSI Gray enamel over corrosion-resistant treatment or rust-inhibiting primer coat.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of conduits to verify the following:
 - 1. Wiring entries comply with layout requirements.
 - 2. Entries are within conduit-entry tolerances specified by manufacturer and no feeders will have to cross section barriers to reach load or line lugs.
- C. Verify that ground connections are in place and that requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" have been met.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLICATION

- A. Fused Power Circuit Device Operating Mechanism: Mechanical Trip, except Electrical Trip for switches with ground-fault protection or remotely tripped switches.
- B. Molded-Case Circuit Breakers OCPD Type: Thermal-Magnetic Circuit Breakers, unless otherwise indicated.

3.03 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.
- E. Anchor floor-mounting switches to concrete base.
- F. Mount top of trim 74 inches above finished floor, unless otherwise indicated.
- G. Mount plumb and rigid without distortion of box. Mount recessed equipment with fronts uniformly flush with wall finish.
- H. Install filler plates in unused spaces.
- I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- J. Close unused conduit opening or other unused holes in sides of box with proper mating blank-off plates.
- K. Do not use gutters of equipment as raceways for routing feeder conductors from bottom entrance to top-feed lugs or vice versa; an external gutter or conduit shall be used for this purpose.

3.04 IDENTIFICATION

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.05 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Perform the following infrared scan tests and inspections and prepare reports:

- a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 4. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
 - D. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
 - E. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- 3.06 ADJUSTING
- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
 - B. Set field-adjustable overcurrent protection device trip characteristics according to settings provided by Engineer-of-Record.
 - C. Settings will be provided by Engineer-of-Record after the submittal process and review of report required by Division 26 Section "Overcurrent Protective Device Studies." are completed.
- 3.07 CLEANING
- A. Clean components according to manufacturer's written instructions.
 - B. Prior to installation of front trim and cover plates inspect interior surfaces and perform the following:
 - 1. Remove paint splatters and other spots.
 - 2. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
 - C. On completion of front trim and cover installation, inspect exterior surfaces and perform the following:
 - 1. Remove paint splatters and other spots.
 - 2. Remove all temporary markings and labels.
 - 3. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
 - 4. Repair exposed surfaces to match original finish.
- 3.08 PROTECTION
- A. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.

END OF SECTION 26 28 16

SECTION 26 33 23 – CENTRAL BATTERY EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This specification defines the electrical and mechanical characteristics and requirements for a stored electrical energy, uninterruptible, emergency power supply system. The system as specified herein includes all the components required to deliver reliable, high quality uninterruptible power for emergency illumination and related life safety equipment. The system shall incorporate an online, dual conversion, advanced DSP controlled, high frequency, IGBT PWM rectifier/charger and inverter, high speed automatic bypass transfer device, battery charging system, energy storage battery platform, a diagnostic monitoring display panel, and all the related hardware components and software to facilitate a functional centralized system. The emergency power supply system shall provide immunity from all line disturbances and power interruptions. The system includes an uninterrupted, normally on output power section and a normally off standby output power section, thus enabling compatibility with emergency lighting fixtures operating in normally on and standby modes. A self-diagnostic monitoring alarm system continuously advises of system status and battery condition.
- B. This Section includes UPS central battery inverters with the following features:
 - 1. Output distribution section.
 - 2. Internal maintenance bypass/isolation switch.
 - 3. Multiple output voltages.
 - 4. Remote monitoring provisions.

1.02 DEFINITIONS

- A. LCD: Liquid-crystal display.
- B. LED: Light-emitting diode.
- C. THD: Total harmonic distortion.
- D. UPS: Uninterruptible power supply.

1.03 STANDARDS

- A. The system shall be designed in accordance with applicable portions of the following standards:
 - 1. American National Standards Institute ANSI C57.110
 - 2. Institute of Electrical and Electronic Engineers IEEE 519-1992
 - 3. National Electrical Manufacturers Association NEMA PE-1
 - 4. National Electrical Code NFPA 70, Article 700
 - 5. National Fire Protection Association NFPA 101 and NFPA 111
 - 6. Underwriters Laboratories UL 924
 - 7. Federal Communications Commission FCC Part 15, Sec. J, Class A
 - 8. Federal Aviation Administration FAA-G-201e
 - 9. Listed UL Standards UL 924 Emergency Lighting Equipment with 90 minutes.

1.04 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Electrical ratings, including the following:
 - a. Capacity to provide power during failure of normal ac.
 - b. Inverter voltage regulation and THD of output current.
 - c. Rectifier data.
 - d. Transfer time of transfer switch.
 - e. Data for specified optional features.
 - 2. Transfer switch.
 - 3. Inverter.
 - 4. Battery charger.
 - 5. Batteries.
 - 6. Battery monitoring.
 - 7. Battery-cycle warranty monitor.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.
 - 1. Wiring Diagrams: Detail internal and interconnecting wiring; and power, signal, and control wiring.
 - 2. Elevation and details of control and indication displays.
 - 3. Output distribution section.

- 1.05 INFORMATIONAL SUBMITTALS
 - A. Source quality-control test reports.
 - B. Field quality-control test reports.
 - C. Warranty: Special warranty specified in this Section.
- 1.06 CLOSEOUT SUBMITTALS
 - A. Operation and Maintenance Data: For central battery inverter equipment to include in emergency, operation, and maintenance manuals.
- 1.07 MAINTENANCE MATERIAL SUBMITTALS
 - A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.
 - 1. Fuses: One for every 10 of each type and rating, but no fewer than three (3) of each.
 - 2. Cabinet Ventilation Filters: One complete set.
 - 3. One spare circuit board for each critical circuit.
- 1.08 QUALITY ASSURANCE
 - A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - B. Central Battery Inverter System: UL 924 and UL 1778 listed.
 - C. Comply with NFPA 70 and NFPA 101.
- 1.09 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver equipment in fully enclosed vehicles.
 - B. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.
- 1.10 WARRANTY
 - A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace central lighting inverter devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.
 - B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace batteries that fail in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for period specified.
 - 1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:
 - a. Premium, Valve-Regulated, Recombinant, Lead-Calcium Batteries:
 - 1) Full Warranty: One year.
 - 2) Pro Rata: 14 years.

PART 2 - PRODUCTS

- 2.01 MANUFACTURERS
 - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Controlled Power Company.
 - 2. Cooper Industries, Inc.; Sure-Lites Division.
 - 3. Crucial Power Products.
 - 4. Dual-Lite.
 - 5. Hubbell Incorporated; Hubbell Lighting.
- 2.02 MANUFACTURED UNITS
 - A. The system shall be designed and manufactured to assure maximum reliability, serviceability and performance. All control devices and system electronics shall be accessible via the front inverter cabinet for rapid service or replacement. The diagnostic monitor panel display shall be mounted on the front of the system for easy observation of system status and battery condition. The system is to be furnished with an internally located AC input circuit breaker and up to 12 output circuit breakers as specified. The battery and DC conductors shall be DC circuit breaker protected. All conductors and transformer windings shall be copper constructed. The installed system shall be floor mounted and wall secured, constructed of steel, with the inverter controls, bypass, and breakers being front accessible through a hinged door, requiring a hand tool for access. The installed inverter cabinet shall be designed to meet NEMA 2 standards, rated for indoor use.
 - B. The system shall operate in accordance with requirements as specified herein to support any combination of fluorescent ballast fixtures, incandescent lamps, electronic and high-power factor fluorescent ballasts, LED or HID fixtures or other approved loads up to the rating of the system. "Normally on" AC output bus shall be 100% rated and limited only by the system's maximum KW output rating.
 - C. Normal Operation: The load is supplied with regulated power derived from the normal AC power input terminals through the rectifier charger and inverter. The rectifier charger shall be fully rated to charge the batteries and supply sufficient DC energy for the inverter when under full load. The battery shall be connected in parallel with the rectifier charger output.

- D. Uninterrupted Emergency Operation: Upon the failure or unacceptable deviation of commercial AC power, energy will be supplied by the battery through the inverter and continue to supply power to the load without switching loss or disturbance. When power is restored at the AC input terminals of the system, the rectifier charger shall continue to supply power to the load through the inverter and simultaneously recharge the batteries. There shall be no break or interruption of power to the load upon failure or restoration of the commercial AC power.
- E. Automatic Bypass Operation: The system shall include a high speed automatic bypass for fault clearing, for instantaneous overload conditions and/or to connect the load to the normal utility source in the event of a system rectifier charger or inverter failure.
- F. Manual Bypass Switch: The system shall include an integral inverter bypass switch for use in case of an inverter failure. The switch shall be accessible via the front of the inverter enclosure, through a hinged door, requiring a hand tool for access. When in the bypass position, the switch shall bypass the inverter power control electronics and divert utility power to the inverter's normally on output bus.

2.03 INVERTER PERFORMANCE REQUIREMENTS

- A. UPS-Type Central Battery Inverters: Continuously provide ac power to connected electrical system.
 - 1. Automatic Operation:
 - a. Normal Conditions: Supply the load with ac power flowing from normal ac power input terminals, through rectifier-charger and inverter, with battery connected in parallel with rectifier-charger output.
 - b. Abnormal Supply Conditions: If normal ac supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, battery supplies constant, regulated, inverter ac power output to the load without switching or disturbance.
 - c. If normal power fails, battery continues supply-regulated ac power through the inverter to the load without switching or disturbance.
 - d. When power is restored at normal supply terminals of system, controls automatically synchronize inverter with the external source before transferring the load. Rectifier-charger then supplies power to the load through the inverter and simultaneously recharges battery.
 - e. If battery becomes discharged and normal supply is available, rectifier-charger charges battery. When battery is fully charged, rectifier-charger automatically shifts to float-charge mode.
 - f. If any element of central battery inverter system fails and power is available at normal supply terminals of system, static bypass transfer switch transfers the load to normal ac supply circuit without disturbance or interruption of supply.
 - g. If a fault occurs in system supplied by central battery inverter and current flows in excess of the overload rating of central battery inverter system, static bypass transfer switch operates to bypass fault current to normal ac supply circuit for fault clearing.
 - h. When fault has cleared, static bypass transfer switch returns the load to central battery inverter system.
 - i. If battery is disconnected, central battery inverter continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.
 - 2. Manual Operation:
 - a. Turning inverter off causes static bypass transfer switch to transfer the load directly to normal ac supply circuit without disturbance or interruption.
 - b. Turning inverter on causes static bypass transfer switch to transfer the load to inverter.

2.04 INPUT SPECIFICATIONS

- A. Input Voltage: 277 VAC.
- B. Input Voltage Operating Range: +12% to -15% at full load without battery usage.
- C. Extended Range: The unit shall incorporate the use of variable range logic in conjunction with the load percentage to extend the input range up to +12% to -30%, without battery usage, while maintaining a regulated output voltage.
- D. Frequency Range: 57.5 Hz to 62.5 Hz.
- E. Power Factor: Self-correcting to >0.97.
- F. Input Current Harmonics: <5% THD.
- G. System AIC Rating: Refer to Drawings.

2.05 OUTPUT SPECIFICATIONS

- A. Output Voltage: 277 VAC.
- B. Sine Wave Voltage: Maximum 3% THD under linear load.
- C. Frequency: 60 Hz +/- 0.5% under full load while in the battery operation mode.
- D. Harmonic Attenuation: Reflected load generated harmonics shall be attenuated at the input.
- E. Voltage Regulation: +/-2%.
- F. Output Power Rating: KVA at 1.0 power factor (unity).

- 2.06 SERVICE CONDITIONS
- A. Environmental Conditions: Inverter system shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
1. Ambient Temperature for Electronic Components: 32 to 98 deg F.
 2. Relative Humidity: 0 to 95 percent, noncondensing.
 3. Altitude: Sea level to 4000 feet.
- 2.07 INVERTERS
- A. Description: Solid-state type, with the following operational features:
1. Automatically regulate output voltage to within plus or minus 5 percent.
 2. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load at unit power factor over the operating range of battery voltage.
 3. Output Voltage Waveform of Unit: Sine wave with maximum 10 percent THD throughout battery operating-voltage range, from no load to full load.
 - a. THD may not exceed 5 percent when serving a resistive load of 100 percent of unit rating.
 4. Output Protection: Ferroresonant transformer to provide inherent overload and short-circuit protection.
 5. Surge Protection: Panelboard suppressors specified in Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."
 6. Overload Capability: 125 percent for 10 minutes; 150 percent surge.
 7. Brownout Protection: Produces rated power without draining batteries when input voltage is down to 75 percent of normal.
- 2.08 BATTERY CHARGER
- A. Description: Solid-state, automatically maintaining batteries in fully charged condition when normal power is available. With LED indicators for "float" and "high-charge" modes.
- B. Recharge Time: UL 924, NFPA 101 compliant, 24 hour recharge.
- 2.09 BATTERIES
- A. Description: Premium, valve-regulated, recombinant, lead-calcium batteries.
1. Capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.
- 2.10 PERFORMANCE SPECIFICATIONS
- A. Overload Rating (without use of static bypass): Up to 102% continuous, 125% for 30 cycles, 150% for 4 cycles when fed from the AC power source, or on battery.
- B. LED Inrush Rating (without use of static bypass): Peak overload capability of 1200% during a current surge of ¼ cycle, when fed from the AC power source or on battery, to accommodate inrush current from LED fixtures/drivers.
- C. Fault Clearing (with bypass available): 150% for 1 minute, 500% for 1 second, 1000% for 1 cycle.
- D. Voltage Regulation: The output voltage shall be regulated to within +/-2% during input voltage changes from +12% to -15% with reference to nominal, and when the output is loaded from no load to full rated load.
- E. Reactive Power Correction: Load at 0.60 pf corrected to >0.97 pf at input (automatically correcting).
- F. Efficiency: 88% typical under full rated load.
- 2.11 ENCLOSURES
- A. NEMA 250, Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.
- B. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment.
- 2.12 CONTROL AND INDICATION
- A. Description: Group displays, indications, and basic system controls on common control panel on front of central battery inverter enclosure.
- B. Minimum displays, indicating devices, and controls shall include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms shall include an audible signal and a visual display.
- C. Indications: Plain-language messages on a digital LCD or LED.
1. Quantitative Indications:
 - a. Input voltage, each phase, line to line.
 - b. Input current, each phase, line to line.
 - c. System output voltage, each phase, line to line.
 - d. System output current, each phase.
 - e. System output frequency.
 - f. DC bus voltage.
 - g. Battery current and direction (charge/discharge).
 - h. Elapsed time-discharging battery.
 2. Basic Status Condition Indications:
 - a. Normal operation.
 - b. Load-on bypass.

- c. Load-on battery.
- d. Inverter off.
- e. Alarm condition exists.
- 3. Alarm Indications:
 - a. Battery system alarm.
 - b. Control power failure.
 - c. Fan failure.
 - d. Overload.
 - e. Battery-charging control faulty.
 - f. Input overvoltage or undervoltage.
 - g. Approaching end of battery operation.
 - h. Battery undervoltage shutdown.
 - i. Inverter fuse blown.
 - j. Inverter transformer overtemperature.
 - k. Inverter overtemperature.
 - l. Static bypass transfer switch overtemperature.
 - m. Inverter power supply fault.
 - n. Inverter output overvoltage or undervoltage.
 - o. System overload shutdown.
 - p. Inverter output contactor open.
 - q. Inverter current limit.
- 4. Controls:
 - a. Inverter on-off.
 - b. Start.
 - c. Battery test.
 - d. Alarm silence/reset.
 - e. Output-voltage adjustment.

D. Dry-form "C" contacts shall be available for remote indication of the following conditions:

- 1. Inverter on battery.
- 2. Inverter on-line.
- 3. Inverter load-on bypass.
- 4. Inverter in alarm condition.
- 5. Inverter off (maintenance bypass closed).

E. Include the following minimum array:

- 1. Ready, normal-power on light.
- 2. Charge light.
- 3. Inverter supply load light.
- 4. Battery voltmeter.
- 5. AC output voltmeter with minimum accuracy of 2 percent of full scale.
- 6. Load ammeter.
- 7. Test switch to simulate ac failure.

F. Enclosure: Steel, with hinged lockable doors, suitable for wall mounting. Manufacturer's standard corrosion-resistant finish.

G. Automatic Self-Testing: Systems shall provide a programmable 5 minute automatic battery test that can be programmed to occur every 30 or 90 days.

2.13 OPTIONAL FEATURES

A. Multiple Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.

B. Maintenance Bypass/Isolation Switch: Switch is interlocked so it cannot be operated unless static bypass transfer switch is in bypass mode. Switch provides manual selection among the following three conditions without interrupting supply to the load during switching:

- 1. Full Isolation: Load is supplied, bypassing central battery inverter system. Normal ac input circuit, static bypass transfer switch, and central battery inverter load terminals are completely disconnected from external circuits.
- 2. Maintenance Bypass: Load is supplied, bypassing central battery inverter system. Central battery inverter ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
- 3. Normal: Normal central battery inverter ac supply terminals are energized and the load is supplied either through static bypass transfer switch and central battery inverter rectifier-charger and inverter or through battery and inverter.

2.14 OUTPUT DISTRIBUTION SECTION

A. Panelboard: Comply with Division 26 Section "Panelboards" except provide assembly integral to equipment cabinet.

- 2.15 SYSTEM MONITORING AND ALARMS
- A. Remote Status and Alarm Panel: Labeled LEDs on panel faceplate shall indicate five basic status conditions. Audible signal indicates alarm conditions. Silencing switch in face of panel silences signal without altering visual indication.
 - 1. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.
 - B. Battery-Cycle Warranty Monitoring: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring charge-discharge cycle history of batteries covered by cycle-life warranty.
 - 1. Basic Functional Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on integral LCD.
- 2.16 SOURCE QUALITY CONTROL
- A. Factory test complete inverter system, including battery, before shipment. Include the following:
 - 1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
 - 2. Full-load test.
 - 3. Transient-load response test.
 - 4. Overload test.
 - 5. Power failure test.
 - B. Observation of Test: Give 14 days' advance notice of tests and provide access for Owner's representative to observe tests at Owner's option.
 - C. Report test results. Include the following data:
 - 1. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
 - 2. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
 - 3. List of instruments and equipment used in factory tests.

PART 3 - EXECUTION

- 3.01 EXAMINATION
- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be installed, before installation begins.
 - B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 INSTALLATION
- A. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- 3.03 CONNECTIONS
- A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.
 - B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - 1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.
 - C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- 3.04 IDENTIFICATION
- A. Identify equipment and components according to Division 26 Section "Identification for Electrical Systems."
- 3.05 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
 - B. Tests and Inspections:
 - 1. Inspect interiors of enclosures for integrity of mechanical and electrical connections, component type and labeling verification, and ratings of installed components.
 - 2. Test manual and automatic operational features and system protective and alarm functions.
 - 3. Test communication of status and alarms to remote monitoring equipment.
 - 4. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specifications. Certify compliance with test parameters.
 - 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - C. Remove and replace malfunctioning units and retest as specified above.
- 3.06 STARTUP SERVICE
- A. Engage a factory-authorized service representative to perform startup service.

- B. Verify that central battery inverter is installed and connected according to the Contract Documents.
 - C. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 26 Sections.
 - D. Complete installation and startup checks according to manufacturer's written instructions.
- 3.07 ADJUSTING AND CLEANING
- A. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 - B. Install new filters in each equipment cabinet within 14 days from date of Substantial Completion.
- 3.08 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain central battery inverters. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 26 33 23

SECTION 26 43 13 - SPD FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes field-mounted SPD for low-voltage (120 to 600 V) power distribution and control equipment.
- B. Related Requirements:
 - 1. Division 26 Section "Panelboards" for field-installed SPDs.

1.02 DEFINITIONS

- A. ATS: Acceptance Testing Specifications.
- B. I-nominal: Nominal discharge current.
- C. MCOV: Maximum continuous operating voltage.
- D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SVR: Suppressed voltage rating.
- H. SPD: Surge Protective Device(s), both singular and plural; also, transient voltage surge suppression.
- I. VPR: Voltage protection rating.

1.03 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 26 Section "Electrical Shop Drawings and Submittals."
- C. Product Data: For each type of product indicated. Include rated capacities, clamp times, physical construction, operating weights, electrical characteristics, furnished specialties, and accessories. Include UL 1449, 3rd Edition Listing documentation verifying:
 - 1. Short Circuit Current Rating (SCCR).
 - 2. Voltage Protection Ratings (VPRs) for all modes.
 - 3. Maximum Continuous Operating Voltage rating (MCOV). The MCOV shall be a tested value per UL 1449 3rd Edition, section 37.7.3. MCOV values based solely on the components used in the construction of the SPD will not be accepted.
 - 4. I-nominal rating (I-n).
 - 5. Type 1 or Type 2 Device Listing.
 - 6. Manufacturer shall provide written test report showing the SPD can survive a single surge at its rated value without the use of circuit breakers or fuses. Single surge ratings based on the sum of components used in the construction of the SPD will not be acceptable.
 - 7. kA rating per phase.
 - 8. kA rating per mode.
- D. Warranty: Special warranty specified in this Section.

1.04 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Certificates: For SPD devices, from manufacturer.
- C. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For SPD devices to include in emergency, operation, and maintenance manuals.
- B. Warranty: Copy of special warranty.

1.06 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
- B. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.
- C. Comply with NEMA LS 1.
- D. Comply with UL 1449, 3rd Edition.
- E. Comply with NFPA 70.

1.07 PROJECT CONDITIONS

- A. Service Conditions: Rate SPD devices for continuous operation under the following conditions unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
 - 2. Operating Temperature: 30 to 120 deg F.

3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet above sea level.

1.08 COORDINATION

- A. Coordinate location of field-mounted SPD devices to allow adequate clearances for maintenance.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANELBOARD SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Current Technology Inc.; Danaher Power Solutions.
2. Liebert Corporation; a division of Emerson Network Power.
3. MTE Corporation.

- B. Surge Protection Devices:

1. Comply with UL 1449, Type 2.
2. Modular design (with field-replaceable modules).
3. Short-circuit current rating complying with UL 1449, and matching or exceeding the panelboard short-circuit rating and redundant suppression circuits; with individually fused metal-oxide varistors.
4. Internal Device Overcurrent Protection (Fuses): All protection modes (including Neutral to Ground) of each surge suppression device shall be internally fused at the component level with fuse I²T capability allowing the suppressor's maximum rated transient current to pass through the suppressor without fuse operation. If the rated I²T characteristic of the fusing is exceeded, the fusing shall be capable of opening in less than one millisecond and clear both high and low impedance fault conditions. The fusing shall be capable of interrupting up to 200 kA symmetrical fault current with 600 VAC applied. This overcurrent protection circuit shall be monitored to provide indication of suppression failure. Conductor level fuses or circuit breakers internal or external to the surge suppression units are not acceptable as meeting this requirement.
5. Each MOV shall be individually fuse protected to avoid cascading faults
6. Fabrication using bolted compression lugs for internal wiring.
7. Redundant suppression circuits.
8. Redundant replaceable modules.
9. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
10. LED indicator lights for power and protection status.
11. Audible alarm, with silencing switch, to indicate when protection has failed.
12. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
13. Four-digit transient-event counter set to totalize transient surges.

- C. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 200 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

- D. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2:

1. Line to Neutral: 100,000 A.
2. Line to Ground: 100,000 A.
3. Line to Line: 100,000 A.
4. Neutral to Ground: 100,000 A.

- E. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 V or 208Y/120 V, 3-phase, 4-wire circuits shall not exceed the follows:

1. Line to Neutral: 1200 V for 480Y/277 V and 700 V for 208Y/120 V.
2. Line to Ground: 1200 V for 480Y/277 V and 700 V for 208Y/120 V.
3. Neutral to Ground: 1200 V for 480Y/277 V and 700 V for 208Y/120 V.
4. Line to Line: 2000 V for 480Y/277 V and 1200 V for 208Y/120 V.

- F. SCCR: Equal or exceed 100 kA.

2.02 ENCLOSURES

- A. Indoor Enclosures: NEMA 250 Type 1.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install SPD devices for panelboards and auxiliary panels conductors between suppressor and points of attachment as short and straight as possible and adjust circuit-breaker positions to achieve shortest and straightest leads. Do not splice and extend SPD leads unless specifically permitted by manufacturer. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
 - 1. Provide 30-A circuit breaker as a dedicated disconnecting means for SPD unless otherwise indicated. Utilize #8 AWG wire for connection to panelboard with maximum wire length of three feet.
- B. Use crimped connectors and splices only. Wire nuts are unacceptable.

3.02 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 - 1. Verify that electrical wiring installation complies with manufacturer's written installation requirements.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
 - 2. After installing SPD devices but before electrical circuitry has been energized, test for compliance with requirements.
 - 3. Complete startup checks according to manufacturer's written instructions.
- D. SPD will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.03 STARTUP SERVICE

- A. Complete startup checks according to manufacturer's written instructions.
- B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests and reconnect them immediately after the testing is over.
- C. Do not energize or connect service entrance equipment or panelboards to their sources until SPD devices are installed and connected.

END OF SECTION 26 43 13

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures.
 - 2. Building mounted exterior lighting fixtures.
 - 3. Exit signs.
 - 4. Lighting fixture supports and accessories.

1.02 DESCRIPTION OF WORK

- A. This work consists of providing all labor, materials, accessories, mounting hardware and equipment necessary for an operationally and aesthetically complete installation of all luminaires, including accessories, in accordance with the contract documents.
- B. Furnish and install all lighting fixtures, as herein specified, complete with lamps, drivers, power supplies, ballasts and accessories for safe and effective operation. All fixtures shall be installed and left in an operable condition with no broken, damaged or soiled parts.
- C. All items furnished shall comply with the latest applicable standards applicable, including UL, NEMA and ETL, and shall bear labels accordingly.
- D. All fixtures shall be the color specified or as selected by the Architect during shop drawing review. Wherever fixtures have evident damage, they shall be restored to new condition or shall be replaced. Likewise, fixtures showing dirt, dust or finger prints shall be restored to new condition or shall be replaced.
- E. Specifications and scale drawings are intended to convey all salient features, functions and characteristics of the light fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work.
- F. Minor details, not usually indicated on the drawings nor specified, but that are necessary for proper execution and completion of the luminaires, shall be included, the same as if they were herein specified or indicated on the drawings.
- G. The Owner, Architect and Engineer shall not be held responsible for the omission or absence of any detail, construction feature, etc. which may be required in the production of the light fixtures. The responsibility of accurately fabricating the light fixtures to the fulfillment of the specification rests with the Contractor.
- H. Where emergency battery packs are provided with fixtures (if any), they shall be connected to an unswitched power line and wired in accord with applicable codes and the manufacturer's recommendations.
- I. Refer to architectural details as applicable for recessed soffit fixtures or wherever fixture installations depend upon work of other trades. Coordinate all installations with other trades. Verify dimensions of spaces for fixtures, and if necessary, adjust lengths to assure proper fit and illumination of diffuser and/or area below.
- J. Pre-manufactured flexible wiring systems are not permitted for this project.

1.03 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. CU: Coefficient of utilization.
- E. HID: High-intensity discharge.
- F. IECC: international Energy Conservation Code.
- G. LER: Luminaire efficacy rating.
- H. Lumen: Measured output of lamp and luminaire, or both.
- I. Luminaire: Complete lighting fixture, including ballast housing if provided.
- J. RCR: Room cavity ratio.
- K. UL: Underwriters Laboratory

1.04 REFERENCE STANDARDS

- A. IESNA LM-80 – Measuring Lumen Maintenance of LED Light Sources.
- B. IESNA HB-10 – IES Lighting Handbook – Tenth Edition.
- C. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum)
- D. NFPA 101 – Life Safety Code
- E. NFPA 70 – National Electrical Code.
- F. UL 924 – Standard for Emergency Lighting and Power Equipment.
- G. UL 1310 – Standard for Safety Class 2 Power Units.
- H. UL 1598 – Luminaires.

1.05 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Electrical Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - 5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
- C. Installation instructions.
- D. Warranty: Sample of special warranty.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
- B. Field quality-control reports.

1.07 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
 - 2. Submit operation and maintenance data in accordance with IECC and as specified herein, showing all light fixtures, control devices and all interconnecting control wire, conduit and associated hardware.
 - 3. Contractor shall be responsible for obtaining from his supplying light fixture manufacturers, for each type of light fixture, a recommended maintenance manual including, tools required, types of cleaners to be used and replacement parts identification list.
- B. Warranty: Copy of special warranty.

1.08 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.
- D. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "Authority Having Jurisdiction," equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70 and NEMA unless more stringent requirements are specified or indicated.
- E. Luminaire drawings shall include dimensions, accessories, and installation and construction details. Photometric data, including zonal lumen data, average and minimum ratio, aiming diagrams and computerized candlepower distribution data shall accompany shop drawings.

1.09 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.10 WARRANTY

- A. The equipment items shall be supported by service organizations which are reasonably convenient (less than 100 miles from project site) to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.
 - 1. All light fixtures/luminaries and controls shall have an unconditional 10-year warranty. Contractor shall warrant light fixtures, lamps, drivers, finishes and all components to be free from defects in materials and workmanship for a period of ten (10) years from date of Owner's acceptance. Replacement of light fixtures and cost of labor shall be the responsibility of the Contractor.
 - 2. Warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under provisions of the Contract Documents and shall be in addition to, and run concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

3. Light fixtures and associated equipment shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.
4. Furnish the electronic LED driver manufacturer's warranty. The warranty period shall not be less than 10 years from the date of substantial completion of the electronic LED driver. The warranty shall state the malfunctioning LED driver shall be exchanged by the manufacturer and promptly shipped to the Owner. The replacement LED driver shall be identical to, or an improvement upon, the original design of the malfunctioning LED driver.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide one of the products indicated on Light Fixture Schedule. Refer to Light Fixture Schedule for manufacturers and model numbers. Basis of design for each type shall be the first fixture manufacturer and model number listed for each type.
- B. Acceptable manufacturers shall be as follows:
 1. Philips
 2. Cooper
 3. Lithonia
- C. Manufacturer's catalog numbers together with the descriptions on the drawings and these specifications are indicative of required design, appearance, quality and performance. Refer any discrepancies between any of these to the Engineer for resolution prior to bid. In absence of such notice to the Engineer, provide the greater requirement as directed by the Engineer, without additional cost.

2.02 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit re-lamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during re-lamping and when secured in operating position.
- E. Diffusers and Globes:
 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
 - b. UV stabilized.
 2. Glass: Annealed crystal glass unless otherwise indicated.
- F. Provide in-line fuse-holders with fuses sized per manufacturer's recommendation for each fixture.
- G. All light fixtures shall be completely wired at the factory in accordance with applicable codes and UL.
- H. All trims and canopies shall fit snugly and securely to the ceiling so that no light leak occurs.
- I. Exterior building mounted light fixtures shall be UL classified for damp or wet locations as applicable and shall be complete with gaskets, cast aluminum outlet box and grounding. All dissimilar metal materials shall be separated by non-conductive materials to prevent galvanic action.
- J. Factory-Applied Labels: Comply with UL 1598. All light fixtures shall be clearly marked for operation of specific LED's and drivers according to proper type. The following characteristics shall be noted in the format "Use Only _____":
 1. LED type, and nominal wattage for light fixture.
 2. Driver type.
 3. Correlated color temperature (CCT) and color rendering index (CRI) for light fixtures.
 4. All markings related to lamp type shall be clear and located to be readily visible to service personnel, but unseen from normal viewing angles when lamps are in place. Ballasts shall have clear markings indicating multi-level outputs and indicate proper terminals for the various outputs.
- K. Provide "maximum wattage label" on all light fixture based on the specified maximum wattage indicated on the light fixture schedule.
- L. Each light fixture shall be packaged with complete instructions and illustrations on how to install.
- M. Each light fixture box, container, etc. shall be labeled at the factory with the type designation as indicated on the Light Fixture Schedule.

2.03 LIGHT EMITTING DIODE (LED)

- A. Light emitting diodes shall be tested under IES LM-80 standards.
- B. Color Rendering Index (CRI) shall be 84 (minimum).
- C. Color temperature of 4000K, or as indicated on light fixture schedule.
- D. Rated lumen maintenance of 90% lumen output at 50,000 hours (minimum).

- E. Rated lumen maintenance of 70% lumen output at 100,000 hours (minimum).
 - F. Provide light fixture types that the LED boards and drivers can be re-placed from the bottom and below ceiling. Trim for the exposed surface of flush-mounted fixtures shall be white or as indicated on light fixture schedule.
- 2.04 LIGHT EMITTING DIODE (LED) ELECTRONIC DRIVERS
- A. Driver shall comply with UL 1310 Class 2 requirements for dry and damp locations, NFPA 70 unless specified otherwise. Drives shall be designed for the wattage of the LEDs used in the indicated application. Drivers shall be designed to operate on the voltage system to which they are connected.
 - B. Power factor shall be 0.95 (minimum).
 - C. Class A Sound Rating.
 - D. Current crest Factor of 1.5 or less.
 - E. Total harmonic distortion (THD): Shall be 20 percent (maximum).
- 2.05 SUSPENDED FIXTURES
- A. Provide hangers capable of supporting twice the combined weight of fixtures supported by hangers.
 - B. Provide with swivel hangers to ensure a plumb installation.
 - C. Hangers shall be cadmium-plated steel with a swivel-ball tapped for the conduit size indicated.
 - D. Hangers shall allow fixtures to swing within an angle of 45 degrees. Brace pendants 4 feet or longer to limit swinging.
 - E. Single-unit suspended fixtures shall have twin-stem hangers.
 - F. Multiple-unit or continuous row fixtures shall have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end.
 - G. Rods shall be a minimum 0.18-inch diameter.
- 2.06 EXIT SIGNS
- A. General Requirements for Exit Signs: Comply with UL 924, NFPA 70, and NFPA 101; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
 - B. Internally Lighted Signs:
 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
 - C. Provide single or double face as scheduled, indicated on plans or as required by the local Authority Having Jurisdiction. Adjust installation position if required for clear visibility, in accordance with applicable codes.
 - D. Provide directional arrows (chevrons) as indicated on floor plans and to suit the means of egress or as required by the local Authority Having Jurisdiction
- 2.07 LIGHTING FIXTURE SUPPORT COMPONENTS
- A. Comply with Division 26 Section "Hangers and Supports for Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
 - B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
 - C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
 - D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12-gauge.
 - E. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12-gauge.
 - F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
 - G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Lighting fixtures:
 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.

2. Mounting heights specified or indicated shall be to the bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures.
 3. Install in accordance with light fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", and NEMA standards.
- B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
- C. Lay-in Ceiling Lighting Fixtures Supports:
1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each fixture. Locate not more than 6 inches from lighting fixture corners.
 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 4. Install at least four independent support wires from structure to a tab on lighting fixture located near each corner of each fixture. Wire shall have breaking strength of the weight of fixture at a safety factor of 3. Round fixtures or fixtures smaller in size than the ceiling grid shall be independently supported from the building structure by minimum of four wires per fixture spaced approximately equidistant around the fixture.
 - a. Support light fixtures with four (4) wires, with one (1) at each corner. Hanger wires shall be installed within 15 degrees of plumb or additional support shall be provided. Wires shall be attached to fixture body and to the building structure (not to the supports of other work or equipment).
 - b. Where building structure is located such that 15 degrees cannot be maintained, the Contractor shall provide "Uni-strut" or similar structure to meet this requirement.
 - c. Support Clips: All light fixtures shall be furnished with hold down clips to meet applicable seismic codes. Provide four (4) clips per fixture minimum or the equivalent thereof in the installation trim. Fasten to light fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application. Contractor shall install clips per manufacturer's requirements. If screws are required, they shall be provided.
- D. Suspended Lighting Fixture Support:
1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 - a. Suspended fixtures in continuous rows shall have internal wireway systems for end to end wiring and shall be properly aligned to provide a straight and continuous row without bends, gaps, light leaks or filler pieces.
 - b. Aligning splines shall be used on extruded aluminum fixtures to assure hairline joints.
 - c. Steel fixtures shall be supported to prevent "oil-canning" effects.
 4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
 5. Pendants shall be finished to match fixtures.
 6. Aircraft cable shall be stainless steel.
 7. Canopies shall be finished to match the ceiling and shall be low profile unless otherwise shown
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- F. Wire exit signs ahead of the switch to the un-switched emergency lighting life-safety branch circuit located in the same room or area.
- G. Exterior building mounted light fixtures shall not be installed until after the building exterior has been rinsed clean of any corrosive cleaning materials. Damaged fixtures shall be replaced by the Contractor at no cost.
- H. Light fixture whips shall be supported from the building structure. Do not clip to lay-in ceiling support wires.
- I. Light fixture locations in mechanical and electrical equipment rooms/areas, as indicated on floor plans, are approximate. Locate light fixtures to avoid equipment, ductwork, and piping. Locate around and between equipment to maximize the available light. Coordinate mounting heights and locations of light fixtures to clear equipment. Request a meeting with the Engineer if uncertain about an installation. All suspended light fixtures shall be mounted square and plumb.
- J. All reflecting surfaces, glass or plastic lenses, ballast housings, parabolic louvers, downlighting alzak cones and specular reflectors shall be handled with care during installation or lamping to avoid fingerprints or dirt deposits. It is preferred that louvers be shipped and installed with clear plastic bags to protect louvers. At close of project, and after construction air filters are changed, remove bags.
- 3.02 IDENTIFICATION
- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.03 CLEANING

- A. At the time of final acceptance by the Owner, all lighting fixtures shall have been thoroughly cleaned with materials and methods recommended by the manufacturer.
- B. Any louver or cone showing dirt or fingerprints shall be cleaned with solvent recommended by the manufacturer to a like-new condition or replaced as necessary in order to turn over to the Owner new fixtures at beneficial occupancy.

3.04 FIELD QUALITY CONTROL

- A. Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Conduct an operating test to show that equipment operates in accordance with requirements of this section.
- B. Electronic Dimming Drivers. Test for full range of dimming capability. Observe for visually detectable flicker over full dimming range.
- C. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- D. Inspect each light fixture for damage. Replace damaged light fixtures at no cost to the Owner.
- E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 26 51 00

SECTION 270010 - GENERAL REQUIREMENTS FOR COMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. This Division and the associated Drawings, Addenda (when issued), and Contract Documents, identifies the requirements, technical design, and specifications for Communications Systems at Fort Bend ISD Triplex located in Sugar Land, Texas
- B. Functionally complete Communications Systems shall be provided in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether or not specifically called for, at no additional cost to Owner.
- C. The Communications Systems include the following:
 - 1. Structured Cabling System
 - 2. And the associated pathways for the systems listed above.

1.02 RELATED SECTIONS

- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 27 and shall be complied with in every respect. The Contractor shall examine all of the items which make up the Contract Documents and shall coordinate them with the work on the project.
- B. Refer to Division 26 for Electrical System requirements.
- C. Refer to Division 28 for Electronic Security requirements.

1.03 CONFIDENTIALITY

- A. Limit access to physical and electronic versions of these Division 27 specifications and associated Drawings to individuals directly involved in performing the Work.
- B. At the conclusion of the Project, cross-shred any physical (paper) copies of both drawings and specifications before disposal.

1.04 ABBREVIATIONS

- A. ADA – Americans with Disabilities Act
- B. AFF – above finished floor
- C. AHJ – authority having jurisdiction
- D. ANSI – American National Standards Institute
- E. AV – audiovisual
- F. BOM – bill of materials
- G. CAT – category
- H. CATV – cable television
- I. CD – Construction Document
- J. DAS – distributed antenna system
- K. EMI – electromagnetic interference
- L. EMT – electrical metallic tubing
- M. ERRC – emergency responder radio coverage
- N. FACP – fire alarm control panel
- O. FCC – Federal Communications Commission
- P. F/UTP – foiled, unshielded twisted pair
- Q. GC – general contractor; Contractor
- R. GMP – guaranteed maximum price
- S. GUI – graphical user interface
- T. HVAC – heating, ventilation, and air-conditioning
- U. IBC – International Building Code
- V. ICT – information and communications technology
- W. IDF – intermediate distribution frame; a secondary Communications Room in a building
- X. IMC – intermediate metal conduit
- Y. ISO – International Organization for Standardization
- Z. ISP – inside plant
- AA. ISP – Internet service provider
- BB. IT – information technology
- CC. LAN – local area network
- DD. MDF – main distribution room; the primary/main Communications Room for a building
- EE. MPOE – minimum point of entry
- FF. MTBF – mean time between failures
- GG. NEC – National Electric Code
- HH. NEMA – National Electrical Manufacturers Association

- II. NFPA – National Fire Protection Association
- JJ. NRTL – nationally recognized testing laboratory
- KK. OEM – original equipment manufacturer
- LL. OSP – outside plant
- MM.PoE – power over Ethernet
- NN. POS – point of sale
- OO.POTS – plain old telephone service
- PP. RF – radio frequency
- QQ.RFI – request for interpretation/information
- RR. RMC – rigid metal conduit
- SS. RU – rack unit
- TT. ScTP – screened twisted pair
- UU. STP – shielded twisted pair
- VV. TIA – Telecommunications Industry Association
- WW.TR – telecommunications room
- XX. U/FTP – unshielded twisted-pair cable with foil screened twisted-pair conductors
- YY. UL – Underwriters Laboratory
- ZZ. UPS – uninterruptible power supply
- AAA. USB – universal serial bus
- BBB. UTP – unshielded twisted pair
- CCC.VLAN – virtual LAN
- DDD.VPN – virtual private network
- EEE. WAN – wide area network
- FFF.WAP – wireless access point
- GGG. WLAN – wireless LAN

1.05 DEFINITIONS

- A. Wherever used in the Division 27 specifications or associated drawings and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. If any of these terms are defined in the General Conditions in Division 1, those definitions shall take precedence.
1. Addenda – written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. Bid – the offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 3. Bidder – the individual or entity who submits a Bid directly to Owner.
 4. Bidding Documents – the Bidding Requirements and the proposed Contract Documents (including all Addenda).
 5. Bidding Requirements – The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 6. Change Order – A document recommended by Design Consultant which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 7. Communication(s) Room – A generic term for a dedicated room for information technology equipment, frequently referred to as Telecommunications Room, Telecom Room, IDF, MDF, IT Room, or Equipment Room.
 8. Contract – The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 9. Contract Documents – Those items so designated in the agreement between Owner and Contractor covering the Work.
 - a. The Contract Documents are complementary; what is required by one is as binding as if required by all.
 10. Contractor – The individual or entity with whom Owner has entered into the Agreement.
 11. Design Consultant – the design firm responsible for creation of these Division 27 specifications and associated Drawings – COMBS Consulting Group LP.
 - a. Except for the following Work, where a third-party is responsible:
 - 1) <insert names of other Division 27 consultants and their associated specification sections and drawing series>
 12. Drawings – The part of the Contract Documents prepared or approved by Design Consultant which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
 13. General Requirements – Sections of Division 1 of the Specifications.
 14. Laws and Regulations – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

15. Notice to Proceed – a written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
16. Owner – the individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
17. Project – the total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
18. Samples – physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which established the standards by which such portion of the Work will be judged.
19. Seismic Design Category – a category from ASCE 07 assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the Project Site.
20. Shop Drawings – all drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
21. Site – lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of the Contractor.
22. Specifications – the part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
23. Subcontractor – an individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
24. Substantial Completion – the time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Architect/Design Consultant, the Work is sufficiently complete, in accordance with the Contract Documents, so that the Work can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
25. Supplementary Conditions – the part of the Contract Documents which amends or supplements these General Conditions.
26. Supplier – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
27. Underground Facilities – all underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
28. Work – the entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

B. Terminology

1. The words and terms below are not defined, but when used in Division 27 specifications and related Drawings, have the indicated meaning:
 - a. Intent of Certain Terms and Adjectives:
 - 1) The Contract Documents include the terms “as allowed,” “as approved,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Design Consultant. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Design Consultant as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Design Consultant any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the following provisions or any other provision of the Contract Documents.
 - a) Limitations on Design Consultant’s Authority and Responsibilities
 - i) Design Consultant will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Design Consultant will not be responsible for Contractor’s failure to perform the Work in accordance with the Contract

Documents.

- ii) Design Consultant will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
 - b. Day – the word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
 - c. Defective – the word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - 1) Does not conform to the Contract Documents; or
 - 2) Does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - 3) Has been damaged prior to Substantial Completion.
 - d. Furnish – the word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - e. Install – the word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - f. Provide – the word “provides” and “perform,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 - g. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied, and those services, materials and equipment shall be furnished and installed.
- C. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contractor Documents in accordance with such recognized meaning.
- D. Refer to individual sections for additional definitions.

1.06 REFERENCE STANDARDS

- A. Standards, Specifications, Codes, Laws, and Regulations
- 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated in the Contract Documents.
 - 2. For referenced standards and guidelines that have not been adopted into code or law, the most recent version / edition of the standard and guideline shall be followed, except for the following:
 - a. where the Contract Documents clearly establish size, quantity, and/or quality of services, materials, or equipment and/or the means, methods, techniques, sequences, or procedures of construction; in these instances, Contract Documents requirements shall take precedence.
 - 3. Whenever the Contract Documents details a requirement that violates an adopted code, law or regulation, submit RFI to Architect/Design Consultant prior to Bid or performing the Work.
- B. Codes and Regulations
- 1. The following codes, laws and regulations are known to have requirements that affect Communications Systems and are listed here for reference. Refer to Part 1 Coordination paragraph in this section for requirements when there are any discrepancies between these codes, laws and regulations and the Contract Documents.
 - a. 2010 ADA Standards for Accessible Design
 - b. ASCE 07 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures
 - c. FCC Rules and Regulations
 - d. National Electric Safety Code
 - e. NFPA 70 – National Electric Code
 - f. NFPA 72 – National Fire Alarm and Signaling Code
 - g. NFPA 99 – Health Care Facilities Code
 - h. NFPA 101 – Life Safety Code
 - i. 2012 Texas Accessibility Standards
 - 2. Refer to individual sections for additional requirements.

1.07 QUALITY ASSURANCE

- A. Contractor Qualifications
- 1. Refer to individual sections for requirements.
- B. Personnel Qualifications
- 1. At all times during the progress of the Work, Contractor or Subcontractor shall assign a competent Project Manager who shall not be replaced without written notice to Owner and Design Consultant except under extraordinary circumstances.
 - 2. Refer to individual sections for additional requirements.

1.08 WARRANTY

A. Contractor's General Warranty and Guarantee

1. If the General Requirements do not establish Contractor's General Warranty and Guarantee, then the following requirements are in effect for Communications Systems Work:
 - a. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Design Consultant and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
 - b. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1) abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2) normal wear and tear under normal usage.
 - c. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1) observations by Design Consultant.
 - 2) recommendation by the Architect/Design Consultant or payment by Owner of any progress or final payment.
 - 3) the issuance of a certificate of Substantial Completion by Architect/Design Consultant or any payment related thereto by Owner.
 - 4) use or occupancy of the Work or any part thereof by Owner.
 - 5) any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Design Consultant;
 - 6) any inspection, test, or approval by others; or
 - 7) any correction of defective Work by Owner.

B. Manufacturer Warranty

1. Refer to individual sections for additional requirements.

C. Special Warranty

1. Refer to individual sections for additional requirements.

1.09 SUBMITTALS

A. General Submittal Requirements:

1. Refer to General Requirements (Division 1) for general submittal requirements. Refer to individual sections in Division 27 for additional requirements.
2. Submittals and Shop Drawings shall not utilize the Design Consultant's logo, stamp, or the title block from the Construction Drawings; if either of these are submitted, the Submittal(s) will be rejected without review.
3. Inadequate or Incomplete Submittals and/or Shop Drawings will not be reviewed and will be returned to the Contractor.

B. Pre-Bid

1. Pre-Bid submittals can generally include:
 - a. Clarifying questions.
 - b. Product Substitution requests.
 - c. Contractor and personnel qualification documentation.
2. Refer to individual sections for specific Pre-Bid requirements.

C. Bid

1. Refer to General Requirements for Bid Form and other requirements.
2. Refer to individual sections for additional Division 27 requirements due with Bid, which may include – but is not limited to – the following:
 - a. Contractor and personnel qualification documentation
 - b. Unit Pricing
 - c. Allowance(s)

D. Pre-Construction

1. Procedures:
 - a. Before submitting Pre-Construction submittals, Contractor shall have:
 - 1) reviewed and coordinated each Shop Drawing with other Shop Drawings and with the requirements of the Work and the Contract Documents.
 - 2) determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto.
 - 3) determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 4) determined and verified all information relative to Contractor's responsibilities for means, methods, techniques,

- sequences, and procedures of construction, and safety precautions and programs incident thereto.
- b. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 - c. With each submittal, Contractor shall give Design Consultant specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separates from the Shop Drawings or submittal; and, in addition, by a specific notation made on each Shop Drawing submitted to Design Consultant for review and approval of each such variation.
 - d. Design Consultant's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents.
 - e. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Design Consultant.
 - f. Contractor shall ensure submittals are submitted in a timely manner to ensure all products can be ordered and received on site in order to not cause any delays. If there are any concerns with any products having long lead times, those products shall be clearly identified in writing so the review and approval can be expedited.
 - g. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e. product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will be returned unreviewed.
2. Bill-of-Materials / Product Index
 - a. Provide a typed listed with each product/equipment being provided as part each Section. List shall include the following, in the exact same order as listed in Division 27 specifications:
 - 1) Product/Equipment specification name
 - 2) Manufacturer
 - 3) Model name
 - 4) Model number
 3. Product Data
 - a. Provide product data sheet for each material, equipment, device, etc. listed in Part 2 of these specifications. Data sheet shall include manufacturer name, product name, part number and relevant product specifications in an 8.5"x11" PDF format.
 - b. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified may not be approved.
 4. Shop Drawings
 - a. Shop Drawings shall include the following:
 - 1) Contractor or Subcontractor's titleblock; drawing size shall match Construction Drawings (ie 30" x 42"). Titleblock shall include:
 - a) Project name and address
 - b) Contractor/Subcontractor company name and contact information.
 - c) Name and contact information of Contractor/Subcontractor's Project Manager.
 - 2) Legend page with all symbols defined.
 - 3) Floors plans (minimum scale of 1/8" = 1'-0") for all areas with Division 27 Work. Floor plans shall include north arrow, keyplan, and indicate device/equipment locations, and associated pathway routing and size.
 - 4) Enlarged plans (minimum scale of 1/4" = 1'-0") and rack and wall elevations for Communications Rooms, Equipment Rooms, etc., indicating exact location where equipment is intended to be installed. Enlarged plans shall include north arrow.
 - 5) Riser diagrams, details, coordination views, etc. to indicate Contractor has a full understanding of required Work and is coordinated with other trades.
 - b. Where installation location is critical – such as in Communications Rooms and Equipment Rooms, as well as outlet/device location height above finished floor – indicate figured dimension on Shop Drawings.
 - c. Refer to individual sections for additional Shop Drawing requirements.
 5. Samples
 - a. Refer to individual sections for requirements.
 6. Certificates
 - a. Refer to individual sections for requirements.
- E. Refer to individual sections for additional Pre-Construction Submittal requirements.
- 1.10 PROJECT CLOSEOUT
- A. Include bolded items in Preliminary Project Closeout Submittal (a minimum of two weeks before Final Site Observation) to facilitate Final Site Observation by Design Consultant.

- B. Bill-of-Materials / Product Index – Update Bill-of-Materials that was included in the Pre-Construction Submittal with actual equipment installed. Include columns populated with the following information:
 - 1. Product Name (from Specifications)
 - 2. Manufacturer
 - 3. Model Number
 - 4. Quantity installed on project
 - 5. Manufacturer Warranty period (if longer than one year)
- C. Product Data (Cutsheets)
 - 1. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- D. Operation and Maintenance Data
 - 1. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- E. Warranty Documentation
 - 1. Include PDF copy of any Warranty documentation and/or certifications that came with the installed products or required by these Specifications.
 - 2. Shall be in the same order as listed in the Specifications and Bill-of-Materials.
- F. Test Results
 - 1. Include PDF copy of Functional Test Reports for each section.
 - 2. Refer to individual sections for testing requirements.
- G. Spare Parts and Tools
 - 1. At time of Owner Training, furnish any and all spare parts and tools to the Owner that are required by the Contract Documents.
 - 2. In the Project Closeout Submittal, include PDF copy of delivery receipt, indicating items and quantities that were furnished to the Owner, as well as the date, time, and Owner Representative that took possession of the items.
 - 3. Refer to individual sections for additional requirements.
- H. Record Drawings (“As Builts”)
 - 1. Maintain a copy of approved Submittals, Shop Drawings, and Change Orders on the Site (or the Project’s Construction Administration website), and update with changes during construction. Any minor changes to the Drawings shall be updated on a weekly basis. These drawings shall be made available for inspection at any point during construction when requested by the Architect / Design Consultant.
 - 2. At the conclusion of the project, utilize AutoCAD or BIM software (such as Revit or Navisworks) to incorporate the changes to the Shop Drawings.
 - a. PDF markups in software such as Bluebeam will not be acceptable.
 - 3. As-Built drawings shall be produced in AutoCAD 2013 or higher and provided in hardcopy and electronically in .dwg and PDF format. Provide (1) laminated copy ARCH C (18” X 24”) in each MDF/IDF.
 - a. Drawings shall have BOTH construction room numbers and the final graphics room numbers.
 - b. PDF Drawings of a scanned copy of a ‘field set’ is NOT acceptable.
 - c. Devices on the drawings shall reflect the labeling standards noted in the individual sections. Reference associated specification sections in Part 1 of this section.
 - 4. Include both PDF and AutoCAD (2013 dwg file type) versions of every drawing in the Project Closeout Submittal.
 - a. PDF needs to be an original, provided to the district not a photocopy converted.
 - 5. Hardcopy drawings shall be provided in the original size as issued by the Architect/Design Consultant.
 - a. Drawings need to have the final room numbers not construction room numbers.
 - b. Drawings should have the network drop name at the user locations in the As-builds.
 - c. PDF needs to be an original provided to the district not a photocopy converted.
 - 6. Refer to individual sections for additional requirements.
- I. Special Requirements – Refer to individual sections for additional requirements.

1.11 COORDINATION

- A. Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to the Architect/Design Consultant any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from the Architect/Design Consultant before proceeding with any Work affected thereby.
- B. If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to the Architect/Design Consultant in writing. Contractor shall not proceed with the Work affected thereby until an amendment or supplement to the Contract Documents has been issued.

- C. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- D. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- E. Refer to General Requirements / Division 1 for Schedule requirements. Subcontractors for Division 27 Work shall coordinate with Contractor in establishing schedules and timetables to perform the Work and perform that Work per those established schedules.
- F. The Contractor/Subcontractor for each Division 27 Section shall maintain a Project Manager (per the Quality Assurance paragraph of that Section) that is on the jobsite whenever Work for that Section is being performed. This Project Manager shall coordinate the Work with other trades, such that Division 27 Work is installed per the Schedule, with the required clearances for all Divisions of Work, and meets the required codes and standards.
- G. Division 27 Work shall not impair, hinder, or delay Work of other trades.
- H. Before starting Work, examine adjacent Work performed by other divisions (trades) to determine if there are any conditions that would be detrimental or prevent Division 27 Work from being a successful installation. Notify issues to Contractor for remediation prior to starting Work.
- I. Unless otherwise indicated with a figured dimension, Drawings are schematic - indicating approximate location of devices and equipment. Communications devices and equipment may be figure-dimensioned on the Architectural Drawings, which take precedence over the approximate locations on the technology Drawings. Where neither Architectural or technology Drawings include a figured dimension, exact location shall be determined by scaled dimension and coordination with requirements of other trades. Errors that could have been avoided by proper coordination shall be corrected without additional costs to the Owner.
- J. Coordination with other Divisions
 - 1. Division 21 Fire Suppression – ensure no piping is routed overhead through a Communications Room or Equipment Room, except where serving a fire suppression device in the Communications/Equipment Room.
 - 2. Division 22 Plumbing – ensure no piping is routed overhead through a Communications Room or Equipment Room.
 - 3. Division 23 Mechanical – ensure no piping or ductwork is routed overhead through a Communications Room or Equipment Room, except where serving Mechanical equipment in the Communications/Equipment Room.
 - 4. Division 26 Electrical
 - a. Ensure no conduits are routed overhead through a Communications Room or Equipment Room, except where serving an Electrical panelboard or receptacles in the Communications/Equipment Room.
 - b. Coordinate exact location of receptacles / hard-wired circuits for Division 27 equipment with Division 26 Contractor prior to rough-in installation.
 - c. Prior to connecting Division 27 devices and equipment to an electrical receptacle, utilize a ground circuit impedance tester to detect any wiring errors and low equipment ground impedances. If any issues are detected, notify Division 26 Contractor for correction prior connecting Division 27 devices and equipment.
 - 5. Refer to individual sections for additional coordination requirements.
- K. Preinstallation Meetings
 - 1. Refer to individual sections for additional requirements.
- L. Sequencing / Scheduling
 - 1. Refer to individual sections for specific sequencing / scheduling requirements.

1.12 STRUCTURAL REQUIREMENTS

- A. For equipment in excess of 200 pounds that is attached to overhead structure, additional structural design analysis is required to confirm overhead structure can support the equipment weight and to determine supports and connection types. This design analysis is Delegated Design, to be completed by the Contractor's structural engineer. The cost of the Delegated Design and required supports and connection types for Communications Systems shall be included in the Contractor's Bid.
- B. Structural Analysis Requirements
 - 1. Structural analysis shall be performed by a structural engineer licensed in the state of the Project. Delegated Design submittals and Shop Drawings shall be stamped by this structural engineer.

1.13 PATENT FEES, ROYALTIES, PERMITS, AND TAXES

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.
- B. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

- C. Unless otherwise provided in the Supplementary Conditions, Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

1.14 DELEGATION OF PROFESSIONAL DESIGN SERVICES

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Design Consultant will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed 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 Design Consultant.
- C. Owner and Design Consultant shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Design Consultant have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph, Design Consultant's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Materials and equipment incorporated into the Work shall be as specified and of good quality and new, except as otherwise noted in the Contractor Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by these specifications or when requested by the Owner or Design Consultant, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- B. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- C. Performance Criteria
 - 1. Regulatory Requirements
 - a. Utilize products listed by a National Recognized Testing Laboratory (such as UL), except where no relevant standard exists. These products shall bear a permanent mark/label of the NRTL.
 - b. All equipment and material used in the installation shall be listed for the environment in which it is being installed. Examples – plenum-rated where installed in a return air plenum; wet or outdoor listed where installed in Wet or Damp Locations.
 - c. Refer to individual sections and products for specific NRTL requirements.
 - 2. Sustainability Characteristics
 - a. Refer to General Requirements / Division 1 for general Project and Product Sustainability requirements.
 - b. Refer to individual Division 27 sections and products for specific Sustainability requirements.
- D. Lead Time Issues
 - 1. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect/Design Consultant prior to submitting a Bid for this work. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues and the Contractor will have all products on-site when needed to complete the Work as required.
- E. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.
- F. In the event of a discrepancy between these Specifications and the Drawings, the greater quantity and/or better quality shall be assumed for Bidding purposes.

2.02 SUBSTITUTES AND "OR EQUALS"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to the Architect/Design Consultant for review under the circumstances described below.

1. "Or-Equal" Items: If in the Design Consultant's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Design Consultant as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. In the exercise of reasonable judgment, the Design Consultant determines that:
 - 1) It is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics.
 - 2) It will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) It has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work
 - 1) There will be no increase in cost to the Owner or increase in Contract Times: and
 - 2) It will confirm substantially to the detailed requirements of the item named in the Contract Documents.
2. Substitute Items:
 - a. If in the Design Consultant's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under the Paragraph above, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Design Consultant to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by the Design Consultant from anyone other than Contractor.
 - c. Contractor shall make written application to the Architect/Design Consultant for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified.
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
 - d. Cost Reimbursement: in certain situations, evaluating a proposed substitution will require additional time by the Design Consultant. These situations will either be described in subsequent Specification sections or conveyed in writing to the Contractor prior to evaluation by the Design Consultant. Design Consultant will record Design Consultant's costs in evaluating the proposed substitution. Whether or not Design Consultant approves the proposed substitution, Contractor shall reimburse Owner for the reasonable charges of Design Consultant for evaluating each proposed substitute. Contractor shall also reimburse Owner for the reasonable costs for Design Consultant, Architect, and Engineer(s) in making changes in the Contract Documents resulting from the acceptance of each proposed substitute.
- B. Proposed equivalent items shall be approved by Design Consultant prior to purchase or installation. Proposed equivalent items shall meet or exceed these specifications and the specifications of the specified item.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Verification of Conditions

1. Prior to submitting a Bid, visit the project Site and existing facility (facilities) and become familiar with the conditions affecting the proposed scope of Work. Make provisions as to the cost associated with the existing conditions and include those costs in the Bid.

2. Existing Interior Conditions
 - a. Refer to Existing Conditions paragraph in Part 1 of this Section.
3. Underground Facilities
 - a. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Communications Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Design Consultant by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1) Owner and Design Consultant shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 - 2) the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a) reviewing and checking all such information and data.
 - b) locating all Underground Facilities shown or indicated in the Contract Documents.
 - c) coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d) the safety and protection of all such Underground Facilities and repairing any damage
 - e) thereto resulting from the Work.
 - b. Not Shown or Indicated:
 - 1) If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Architect/Design Consultant. Architect/Design Consultant will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- B. Preinstallation Testing
 1. Refer to individual sections for requirements.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.
- D. No deviations from the Contract Documents shall be made without full consent in writing of the Architect/Design Consultant. The Contractor shall have written approval from the Architect/Design Consultant for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Design Contractor prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- E. Cleaning
 1. During the progress of the Work, Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations. Contractor shall dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
 2. Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- F. Protection
 1. The Contractor shall protect Communications Work from damage by other trades and theft.
 - a. Any Division 27 cabling that has more than 3-inches of paint on the jacket shall be replaced without additional cost to the Owner.
 2. Where owner-furnished or provided equipment is installed prior to Substantial Completion, access to that room or area shall be restricted/locked whenever unoccupied.
- G. Power
 1. Prior to connecting any Communications equipment to a power receptacle, use a ground circuit impedance tester to confirm AC wiring and grounding has been installed correctly; confirm voltage and neutral-to-ground wiring are correct prior to energizing equipment. If not correct, notify Division 26 Contractor of the issue.
- H. Temporary Power, HVAC, and Communications Systems
 1. Where owner-furnished or provided network equipment is required to be installed prior to Substantial Completion in order for Communications Systems Work to be functional, the room or area where that network equipment is installed shall be

equipped with permanent or temporary power and heating/cooling at no additional costs to the Owner. Acceptable temperature range is 60 to 89 degrees Fahrenheit.

2. When, through no fault of the Owner or Architect/Design Consultant, Communications Systems Work is not completed by Substantial Completion, temporary Communications Systems may be required while the Site is partially occupied by the Owner and shall remain installed until acceptance of permanent system(s); refer to individual sections for requirements.

3.02 INTEGRATION REQUIREMENTS

- A. Refer to individual sections for integration requirements.

3.03 REPAIR / RESTORATION

- A. Contractor shall be responsible for the repair of any damage caused by the Contractor or Subcontractors during the installation.
- B. Selective demolition may be necessary to facilitate installation of Communications Systems equipment and pathways. The Contractor shall obtain written permission from the Architect/Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings. After installation, Contractor shall restore floors, walls, roofs, and ceilings to their original condition.
 1. Avoid penetrations or installation of equipment onto or through waterproof assemblies such as roofs, exterior walls, and slab-on-grade floors. If installation cannot be avoided, install before waterproofing; protect installation area from weather/elements until sealing and waterproofing is complete.

3.04 FUNCTIONAL AND PERFORMANCE TESTING

- A. After components have been installed, perform functional tests to ensure system components are installed and configured correctly in conformance with manufacturer's instruction and the Contract Documents. Correct any issues and retest. Include Test Report documentation in Preliminary and Final Project Closeout Submittals.
- B. Third-party testing or manufacturer onsite services may be necessary for certain Division 27 systems or sub-systems; refer to individual sections for exact requirements.
- C. Refer to individual sections for additional testing requirements.

3.05 FIELD OBSERVATIONS

- A. A minimum of two weeks in advance, notify Design Consultant and Owner as to the readiness for a Field Observation for the following:
 1. Rough-In Observation – after conduits have been installed, but before walls have been installed.
 2. Above Ceiling Observation – after cabling has been installed, but before ceilings have been installed.
 3. Final Site Observation – a minimum of two weeks before Substantial Completion, to occur after Preliminary Project Closeout Submittal has been submitted.
- B. Non-Conforming Work
 1. After receipt of written notice of defective Work, Contractor shall correct all defective Work, or, if the Work has been rejected by the Architect/Design Consultant, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages arising out of or relating to such correction or removal.

3.06 DEMONSTRATION, TRAINING, AND ADJUSTMENTS

- A. Conduct training sessions to Owner's personnel to demonstrate system operation and preventative maintenance procedures.
 1. Refer to individual sections for additional training requirements.
- B. After Owner has taken occupancy, Communications Systems equipment and components may require minor adjustments to be performed by the Contractor/Subcontractor to align with Owner's actual use of the systems. Refer to individual sections for specific adjustment requirements.

3.07 SOFTWARE, NETWORK, AND CYBERSECURITY REQUIREMENTS

- A. Software Requirements
 1. All firmware found in products furnished or provided by the Contractor shall be the latest and most up-to-date provided by the manufacturer.
 2. All equipment requiring users to log on using a password shall be configured with user/site-specific password(s). No system/product default passwords shall be allowed. Coordinate user logins and passwords with Owner prior to system setup.
 3. Refer to individual sections for additional software requirements.
- B. Network and Cybersecurity Requirements
 1. For all Communications Systems that have Contractor-provided equipment with an Ethernet/LAN port, Contractor shall coordinate with Owner's IT staff regarding Owner's network and cyber security requirements.
 2. Within two weeks after Notice to Proceed, the Contractor (and/or Subcontractors for each Communications System) shall request an IT Coordination Kickoff Meeting with Owner's IT staff to ascertain and document Owner's requirements. Contractor shall document this meeting and send meeting minutes to all parties in attendance as well as Architect/Design Consultant.
 3. At a minimum, coordinate the following network requirements for Contractor-provided equipment with the Owner's IT staff:

- a. IP address quantities and assignments for each equipment type and location, including subnets and subnet masks.
 - b. PoE quantities and power requirements (PoE, PoE+, high powered PoE, etc) for each equipment type and location.
 - c. Bandwidth requirements, including any prioritization or unicast/multicast requirements.
 - d. VLAN use and assignment
 - e. Encryption requirements
 - f. WAN connection requirements
 - g. Firewalls
 - h. Planned approach for software upgrades and security patching.
 - i. Follow additional network requirements and procedures as directed by the Owner's IT staff.
4. The Contractor shall take positive measures to prevent the introduction of cybersecurity threats to the Owner's technology infrastructure and network. These measures shall include but are not limited to:
- a. The Contractor shall scan contractor-provided or furnished equipment for cyber threats such as viruses, malware, ransomware, etc., prior to connecting the equipment to the Owner's network.
 - b. Coordinate with the manufacturer to ensure newly procured equipment does not have any cybersecurity notices, bulletins, or alerts. Provide a letter to the Design Consultant with the submittal documents for that Specification section confirming there are no active or known cyber threats.
 - c. Ensure all installers/technicians installing or configuring equipment are trained on the prevention of introduction of cyber threats to electronics.
 - d. The Contractor shall assess whether or not there are any cyber threats / vulnerabilities associated with the specified equipment, prior to procurement/installation. If cyberthreats are discovered, notify the Design Consultant within one Day. Provide the make and model of the associated equipment and the vulnerability.
 - e. Follow additional cybersecurity requirements and procedures as directed by the Owner's IT staff.
5. Refer to individual sections for additional Networking and Cybersecurity Requirements.

3.08 MAINTENANCE

A. Warranty Service

- 1. Pursuant to Contractor's General Warranty and Guarantee, Owner may request Warranty Service for a period of 1 year after Substantial Completion for Communications Systems components due to faulty material or installation.
- 2. Upon written notice from Owner, promptly perform remedial / corrective Work to bring the associated system(s) to compliance with the Contract Documents and satisfaction of the Owner.
 - a. In this context, "promptly" means within 7 Days, unless a quicker response and remediation time is specified in the associated Division 27 specification section.
- 3. Refer to individual sections for additional Warranty Service requirements.

B. One Year Warranty Check

- 1. 50 weeks after Substantial Completion, Contractor or Subcontractor for each Division 27 section shall conduct a site visit with Owner's facility personnel to ensure systems and components are still operating as intended / required by the Contract Documents. Promptly perform corrective Work while on site or within 7 Days.
 - a. Pursuant to Contractor's General Warranty and Guarantee, corrective Work is not required if system / component is deficient due to:
 - 1) abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2) normal wear and tear under normal usage.

3.09 DRAWINGS AND SPECIFICATIONS AFTER SUBSTANTIAL COMPLETION

A. Contractor and any Subcontractor or Supplier shall not:

- 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by Combs Consulting Group, LP, including electronic media editions; or
- 2. reuse any such Drawings, Specifications, other documents, or copies thereof on any other project without written consent of COMBS Consulting Group, LP.

B. The prohibitions in the paragraph above survive final payment, or termination of Contract. Nothing herein shall preclude Contractor or Owner from retaining copies of the Contract Documents for record purposes.

C. Physical paper copies of Drawings and Specifications shall be properly destroyed (shredded) when no longer needed to perform the Work.

END OF SECTION 270010

SECTION 270533 - PATHWAYS FOR COMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section and the associated Technology (T Series) AudioVisual (TA Series), PA (TPA Series) and Security (TS Series) Drawings and Contract Documents identify the requirements, technical design, and specifications for pathways for Communications Systems for the Project. The conduit and backboxes shall be in compliance with the latest version of TIA-569 and the locally adopted version of the NFPA 70 (National Electric Code) and shall include all components needed to ensure proper system performance and code compliance as specified.
- B. Functionally complete pathways shall be provided in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether or not specifically called for, at no additional cost to Owner.
- C. The pathways for Communications Systems includes the following main components:
 - 1. Conduit / Sleeves and accessories
 - 2. Backboxes
 - 3. Floorboxes / Poke Thru Devices
 - 4. Pullboxes (Junction Boxes)
 - 5. Wire-mesh Cable Tray
 - 6. Surface Raceways and Boxes
 - 7. Firestopping Systems
 - 8. Labeling

1.02 RELATED SECTIONS

- A. Work required by this Section shall meet the requirements of Section 27 00 10 General Requirements for Communications.
- B. Refer to Division 26 for Electrical System requirements, including but not limited to additional material and installation requirements for Communications Systems conduit, backboxes, floorboxes, and pullboxes.
- C. Refer to Section 27 00 10 for associated General Requirements for Communications
- D. Refer to Section 27 10 00 for associated Structured Cabling requirements.
- E. Refer to Section 27 51 00 for associated Public Address and Clock System
- F. Refer to Section 28 13 00 for associated Access Control System
- G. Refer to Section 28 23 00 for associated Video Surveillance System

1.03 CONFIDENTIALITY

- A. Refer to Section 27 00 10 for confidentiality requirements.

1.04 ABBREVIATIONS

- A. NECA – National Electrical Contractors Association
- B. NEMA – National Electrical Manufacturers Association
- C. Refer to Section 27 00 10 for additional abbreviations.

1.05 DEFINITIONS

- A. Transition Point Enclosure
- B. Refer to Section 27 00 10 for additional definitions.

1.06 REFERENCE STANDARDS

- A. Codes and Regulations
 - 1. Refer to Section 27 00 10 for additional Codes and Regulations.
- B. Standards
 - 1. NECA 1 – Standard for Good Workmanship in Electrical Construction
 - 2. NECA/BICSI 568 - Installing Commercial Building Telecommunications Cabling
 - 3. NECA/BICSI 607 – Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
 - 4. TIA 569 – Telecommunications Pathways and Spaces
 - 5. TIA 606 – Administration Standard for Telecommunications Infrastructure
 - 6. TIA 607 – Generic Telecommunications Bonding and Grounding for Customer Premises
 - 7. Refer to Section 27 00 10 for additional Standards.
- C. Guidelines
 - 1. BICSI – Telecommunications Distribution Methods Manual
 - 2. NEMA VE 2 - Metal Cable Tray Installation Guidelines
 - 3. Refer to Section 27 00 10 for additional Guidelines.

1.07 QUALITY ASSURANCE

- A. Contractor Qualifications

1. The Contractor shall be a Panduit Gold Certified.
2. The Contractor shall have been in business for a minimum of five (5) years.
3. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project Site.
4. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
5. The Contractor shall have a minimum of (2) certified BICSI and Panduit certified installers, full-time employees of the company and on onsite at all times.
6. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.
7. Firestopping Contractor Qualifications
 - a. Firestopping materials shall be part of a UL listed System and installed by a certified technician.
 - b. Contractor / Subcontractor installing Firestopping shall be qualified and properly trained, with at least one of the following certifications:
 - 1) FCIA (Firestop Contractors International Association) – FM 4991 Approval
 - 2) UL Qualified Firestop Contractor
 - 3) Installation Certification through firestopping manufacturer.
 - a) Specified Technologies, Inc products – all installers shall be FIT Level 1 Certified through STI.
 - b) Hilti products – Contractor / Subcontractor shall be part of Hilti Firestop Specialty Contractor Program
 - c) Or Approved Equivalent
 - c. Submit proof of certification as part of Pre-Construction Submittal.
8. Refer to Section 270010 for additional Contractor Qualifications requirements.

B. Personnel Qualifications

1. At all times during the progress of the Work, Contractor (or Subcontractor) responsible for the Work of this Section shall assign a competent Project Manager with the following qualifications / credentials:
 - a. A minimum of five years of experience overseeing installation of Communications Pathways and who is familiar with the requirements of TIA and BICSI Reference Standards listed above.
2. Include resume(s) of the above personnel per Submittal requirements and when requested by Owner or Design Consultant.

C. Site Observations

1. Contractor's RCDD (per Section 271000 Structured Cabling) shall make weekly inspections during construction to ensure Pathways for Structured Cabling are installed properly and per the Contract Documents.
2. Contractor's PA and Clock (per Section 275100 Public Address and Clock System) shall make weekly inspections during construction to ensure Pathways for Structured Cabling are installed properly and per the Contract Documents.
3. Contractor's CTS-I/CTS-D (per Section 274100 Audio Visual Systems) shall make weekly inspections during construction to ensure Pathways for Audio Visual Systems are installed properly and per the Contract Documents.

1.08 WARRANTY

A. Refer to 270010 for General Warranty requirements.

B. Manufacturer Warranty

1. Panduit Manufacturer's 25-Year Performance Certification for the installed structured cabling system.

C. Contactor's Statement of Warranty

1. Statement of warranty shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect/Design Consultant.
 - a. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor, and workmanship starting at final system acceptance.
 - b. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number, and email address) and start and end date for warranty call outs.

D. Special Warranty

1. No special warranty is required for Pathways for Communications Systems.

1.09 SUBMITTALS

A. Refer to Section 270010 for General Submittal Requirements.

B. Pre-Bid

1. Submit clarifying questions and product Substitution Requests prior to the questions deadline prior to Bid.
2. Submit Contractor and Personnel Qualifications documentation indicating that the requirements of the Quality Assurance paragraph of this Section and Section 270010 are met.

C. Bid

1. Refer to Section 270010 for general Bid requirements.
- D. Pre-Construction
 1. Refer to Section 270010 for general Pre-Construction Submittal requirements and procedures.
 2. Pre-Construction Submittal for this Section shall include the following:
 - a. Bill-of-Materials
 - b. Product Data
 - c. Firestopping UL System information
 - d. Shop Drawings
 - 1) Refer to Section 270010 for general Shop Drawing Requirements
 - 2) Shop Drawings for Work of this Section shall also include:
 - a) Floor plans showing the following work:
 - i) Cable tray routing, size and height AFF. Cloud minor changes from Drawings and indicate reason for minor deviation – ie “Routed on west side of corridor due to conflict with mechanical duct.” Submit RFI for major changes in routing – ie when coordination issues require cable tray to be routed in different room.
 - ii) Dimensioned multi-service floor box and poke thru device locations. For slab-on-grade floor boxes, also indicate quantity, size and routing of conduit under/in slab to serving Communications Room (for Structured Cabling) and to rack or accessible ceiling space (for Audio Visual).
 - b) Pathways for Structured Cabling (including firestopping requirements identified by UL System number) shall be identified on Section 271000 Shop Drawings.
 - c) Pathways for Audio-Visual Systems (including firestopping requirements identified by UL System number) shall be identified on Section 274100 Shop Drawings.
 - d) Pathways for Paging Systems (including firestopping requirements identified by UL System number) shall be identified on Section 275100 Shop Drawings.

1.10 PROJECT CLOSEOUT

- A. Refer to Section 270010 for general Project Closeout submittal requirements.
- B. Project Closeout submittal for this Section shall include the following:
 1. Bill-of-Materials / Product Index
 2. Product Data
 3. Operation and Maintenance Data
 4. Warranty Documentation
 5. Test Results
 6. Training and Spare Parts
 - a. Signed acceptance letter or form indicated Owner has been properly trained in operation of the system and has taken possession of the specified Spare Parts and Tools (items listed as “Furnish to Owner”).
 7. Record Drawings (“As Built”)
 - a. Maintain a copy of approved Shop Drawings on the Site (or the Project’s Construction Administration website), and update changes to pathways made during construction.
 - b. At the conclusion of the project, utilize AutoCAD or BIM software (such as Revit or Navisworks) to incorporate the pathway changes to the Shop Drawings.
 - c. PDF markups in software such as Bluebeam will not be acceptable.
 - d. As-Built drawings shall be produced in AutoCAD 2013 or higher and provided in hardcopy and electronically in .dwg and PDF format. Provide (1) laminated copy ARCH C (18” X 24”) in each MDF/IDF.
 - e. Drawings need to have the final room numbers not construction room numbers.
 - f. Drawings should have the network drop name at the user locations in the As-builds.
 - g. PDF needs to be an original provided to the district not a photocopy converted.
 - h. Include both PDF and AutoCAD (2010 dwg file type) versions of every drawing in the Project Closeout Submittal.

1.11 COORDINATION

- A. Refer to Section 270010 for general Coordination requirements.
- B. Coordination with other Divisions and Sections
 1. Coordinate routing of cable tray with other trades prior to construction. Installation of cable tray without required clearances will not be accepted. Include in Bid cost of minor cable tray routing adjustments (within the same corridor) due to conflicts with other trades.
- C. Preinstallation Meeting
 1. After Bid and before Preconstruction Submittals, request a Preinstallation Meeting with General Contractor and other Division 27 and 28 Subcontractors regarding Work specified in this Section.

1.12 STRUCTURAL AND SEISMIC REQUIREMENTS

- A. Refer to Section 270010 for structural and seismic requirements.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Refer to Section 270010 for general product requirements.

2.02 CONDUIT / SLEEVES AND ACCESSORIES

A. Electric Metallic Tubing (EMT) and fittings

- 1. Refer to Division 26 for specific product and material requirements.
- 2. Shall meet ANSI C80.3, UL 797
- 3. Manufacturers:
 - a. Allied Tube or equivalent

B. Intermediate Metal Conduit (IMC) and fittings

- 1. Refer to Division 26 for specific product and material requirements.
- 2. Shall meet ANSI C80.6, UL 1242
- 3. Manufacturers:
 - a. Allied Tube or equivalent

C. Rigid Metallic Conduit (RMC) and fittings

- 1. Refer to Division 26 for specific product and material requirements.
- 2. Shall meet ANSI C80.1, UL 6
- 3. Manufacturers:
 - a. Allied Tube or equivalent

D. Conduit Support / Fittings / Accessories

- 1. Conduit Clamps
 - a. Caddy Screw On Conduit Clips – For 1-inch – Part No. CS16
 - b. Or equal
- 2. 1-5/8" Framing System
 - a. Unistrut Support Channel – Part No. P1000 T
 - b. Or equal
- 3. Conduit Bushings
 - a. Nylon Bushings Sized for the Conduit Installed
- 4. Innerduct
 - a. Install size and type as identified on Drawings.
 - b. 1" or 1-1/4" diameter
 - c. Composed of HDPE (High Density Polyethylene)
 - d. UL listed for Riser Plenum installation
 - e. Footage markings every two feet
 - f. With pull tape preinstalled
 - g. Manufacturer:
 - 1) Innerduct
 - 2) Carlon
 - 3) Panduit
- 5. Fabric Innerduct
 - a. Textile innerduct
 - b. Type (cell size and quantity) as identified on Drawings.
 - c. UL listed for Riser installation
 - d. With pull tape preinstalled in each cell
 - e. Manufacturer:
 - 1) MaxCell
 - 2) No Substitutions

2.03 BACKBOXES

A. Size, Gang, and Trim Ring per Drawings

B. Boxes installed into stud walls:

- 1. Single gang:
 - a. 2" by 3" by 2-1/2" deep
 - b. Manufacturer:
 - 1) RACO xxx
 - 2) Or equal from: xxx
- 2. Double gang:
 - a. 4-11/16" by 4-11/16" by 2-1/8" deep
 - b. With a minimum of 3/8" deep trim ring; depth to match thickness of gypboard wall material.

- c. Manufacturer:
 - 1) RACO xxx
 - 2) Or equal from: xxx
 - 3. TV Display backbox:
 - a. Specialty in-wall backbox
 - b. Minimum dimensions: 7" tall by 14.25" wide by 3.9" deep
 - c. With (2) 1-gang knockouts in top for power receptacle and data outlet
 - d. With a minimum of (1) 1-1/4" knockouts in top and bottom for AV conduits
 - e. With [white] [black] cover with slot openings for cables and ventilation
 - f. Manufacturer:
 - 1) Chief PAC525FC
 - 2) FSR PWB-250
 - 3) Or Approved Equal
 - 4. TV Display backbox – shallow depth
 - a. Specialty in-wall backbox
 - b. Minimum dimensions: 7" tall by 14.25" wide
 - c. Maximum depth: 3"
 - d. With (2) 1-gang knockouts in top for power receptacle and data outlet
 - e. With a minimum of (1) 1-1/4" knockouts in top and bottom for AV conduits
 - f. With [white] [black] cover with slot openings for cables and ventilation
 - g. Manufacturer:
 - 1) FSR PWB-253
 - 2) Or Approved Equal
 - 5. TV Display backbox – fire-rated wall
 - a. Specialty in-wall backbox
 - b. Minimum opening dimension: 10" by 8"
 - c. With (4) pre-wired electrical outlets (120V AC)
 - d. With (2) 1-1/2" knockouts in top and bottom for AV conduits
 - e. With [white] [black] cover with slot openings for cables and ventilation
 - f. [With bracket to install Crestron RMC device]
 - g. Manufacturer:
 - 1) FSR PWB-FR-450
 - 2) Or Approved Equal
 - C. Boxes installed into CMU (concrete masonry unit) walls:
 - 1. Single gang:
 - a. 2" by 3" by 3-1/2" deep
 - b. Manufacturer:
 - 1) RACO xxx
 - 2) No substitutions
 - 2. Double gang:
 - a. 2" by 3" by 3-1/2" deep
 - b. Manufacturer:
 - 1) RACO xxx
 - 2) No substitutions
 - D. Boxes installed in exterior / Wet locations:
 - 1. Shall be die-cast aluminum- with watertight covers to fit installed size.
 - 2. Manufacturer:
 - a. 1-gang: xxx
 - b. 2-gang: xxx
 - E. Specialty AV Backboxes
 - 1. Size per Drawings
 - 2. Boxes identified by Manufacturer and Model number represent the Basis-of-Design. Alternate manufacturers will be considered; submit Substitution Request in compliance with Division 1.
- 2.04 FLOORBOXES / POKE THRU DEVICES
- A. Multi-service Floor box – Power and Data only
 - 1. Shall have a minimum of 4-gangs, with separate compartments for power and data.
 - 2. Shall accept (1) (2) 1-inch 1-1/4-inch conduit(s) reserved for data cabling.
 - 3. Stamped steel box, concrete-tight construction.

4. Shall maintain fire-rating of floor.
 5. Provide power insert for every duplex indicated on Electrical Drawings.
 6. Provide decora-style opening insert for every four data jacks on Technology Drawings.
 7. Provide blank inserts for any unused gangs.
 8. Coordinate cover plate style and type with Architect.
- B. Multi-service Floor box – Power and Data only – Slab-on-Grade locations
1. Shall have a minimum of 4-gangs, with separate compartments for power and data.
 2. Shall accept (1) (2) 1-inch 1-1/4-inch conduit(s) reserved for data cabling.
 3. Cast iron box, watertight, Class 1 construction.
 4. Provide power insert for every duplex indicated on Electrical Drawings.
 5. Provide decora-style opening insert for every four data jacks on Technology Drawings.
 6. Provide blank inserts for any unused gangs.
 7. Coordinate cover plate style and type with Architect.
- C. Multi-service Floor box – Shared Power, Data and Audio-Visual
1. Refer to Section 27 41 00 for AV Floor box requirements.
- D. Multi-service Poke Thru Device – Power and Data only
1. 6-inch diameter flush-mounted poke thru
 2. 2-inch conduit opening for
 3. UL listed and UL fire classified to match rating of floor
 4. Provide power insert for every duplex indicated on Electrical Drawings.
 5. Provide decora-style opening insert for every four data jacks on Technology Drawings.
 6. Provide blank inserts for any unused gangs.
 7. Coordinate cover plate style and type with Architect.
- E. Multi-service Poke Thru Device – Shared Power, Data and Audio-Visual
1. Refer to Section 27 41 00 for AV Poke Thru Device requirements.
- 2.05 PULLBOXES (JUNCTION BOXES) - NOT TO BE USED FOR CABLE PATH TURNS.
- A. Sized per Part 3 of this Section
- B. Metallic or steel construction
- C. Removable cover. Boxes with a dimension greater than 24-inches shall have a hinged cover.
- D. Interior locations: NEMA Type 1
- E. Damp or Wet Locations (as defined by the NEC): NEMA Type 4
- F. Manufacturer:
1. NEMA Enclosures
 2. Hoffman
 3. Custom NEMA enclosures from sheet metal shop / fabricator
 4. Or equivalent
- 2.06 SURFACE RACEWAYS AND BOXES - NOT TO BE USED FOR CABLE PATH TURNS.
- A. Metallic Surface Raceways
1. Minimum cross-sectional area of low-voltage compartment shall be 1-square inch.
 2. Manufacturer shall be:
 - a. Hubbell
 - b. Wiremold
 - c. Panduit
 - d. Monosystems
- B. Metallic Surface Box
1. Single-gang or double-gang per Drawings
 2. Minimum interior depth shall be 2-1/2-inches.
 3. Manufacturer shall be:
 - a. Same as Metallic Surface Raceway
- C. Non-metallic Surface Raceways
1. Minimum cross-sectional area of low-voltage compartment shall be 1-square inch.
 2. Manufacturer shall be:
 - a. Hubbell
 - b. Wiremold
 - c. Panduit
 - d. Monosystems
- D. Non-Metallic Surface Box
1. Single-gang or double-gang per Drawings

2. Minimum interior depth shall be 2-1/2-inches.
 3. Manufacturer shall be:
 - a. Same as Non-Metallic Surface Raceway
- 2.07 WIRE-MESH CABLE TRAY AND ACCESSORIES
- A. Flexible, wire-mesh cable tray, with wire-mesh openings of approximately 2-inches by 4-inches, welded at all intersections.
 - B. UL listed as an equipment grounding conductor.
 - C. Contractor shall use associated hardware to provide solid support and grounding (sized appropriately according to manufacture specifications) to be used outside the MDF/IDF and a minimum of 20' in any direction cabling trunks leave MDF/IDF.
 - D. Size per Drawings.
 - E. Utilize manufacturer-specific accessories as needed, including but not limited to:
 1. Splice kits
 2. Trapeze Support Brackets (center support brackets are not allowed)
 3. 3/8-inch (or larger) threaded rod
 4. Wall / Triangular Support Brackets
 5. Split Bolt Grounding Clamp
 - F. Manufacturer:
 1. Panduit
 2. Or Approved Equivalent
- 2.08 FIRESTOPPING SYSTEMS
- A. Fire-Rated Pathway Device (Sleeve)
 1. Steel pathway (sleeve) with integral intumescent firestopping material to facilitate the initial installation - and frequent moves, adds, and changes - of low-voltage voice/data, fiber, video, security, paging, etc cabling.
 2. UL System meeting the hourly fire-rating of the wall or floor type
 3. Multiple pathways in the same location shall be ganged together.
 4. Plenum-rated
 5. Manufacturer:
 - a. Specified Technologies Inc – EZ Path Fire-Rated Pathway
 - 1) 2" – Series 22
 - 2) 3" – Series 33
 - 3) 4" – Series 44
 - B. Firestopping for conduit penetrations
 1. For metallic conduit or tube to be installed through 1 or 2 hr fire-rated wall or floor.
 2. Manufacturer:
 - a. Gypsum board stud walls
 - 1) Specified Technologies - UL System No. W-L-1222 with SpecSeal LCI Sealant
 - 2) Or equivalent from Hilti
 - b. Concrete floors or walls
 - 1) Specified Technologies – UL System No. C-AJ-1353 with SpecSeal LCI Sealant
 - 2) Or equivalent from Hilti
 - C. Firestopping for backboxes in fire- or smoke-rated wall
 1. For Communications backboxes to be installed in 1 or 2 hr fire-rated or smoke-rated walls.
 2. STC sound rating – 64 or higher (related to specific construction)
 3. Shall meet criteria of UL263 and classified for up to hrs as a Wall Opening Protective Material (Category CLIV)
 4. Manufacturer:
 - a. Specified Technologies – SpecSeal Power Shield
 - b. Or equivalent from Hilti
 - D. Smoke-Rated or Acoustical Sleeves
 1. Metallic or non-metallic pathway (sleeve) with integral self-adjusting smoke and sound sealing system to facilitate the initial installation – and frequent moves, ads, and changes – of low-voltage voice/data, fiber, video, security, paging, etch cabling.
 2. L Rating – Air Leakage Test Procedure tested per UL1479 without a Fire Test
 3. Less than 1.25 cubic feet per minute for 0% fill (cable) capacity
 4. Less than 2.5 cubic feet per minute for 1 to 100% fill (cable) capacity
 5. Sound Transmission Classification (STC) – 59 or higher (related to specific construction)
 6. Plenum-rated
 7. Manufacturer:
 - a. Specified Technologies Inc – NEZ Pathway

- b. Hilti – Smoke and Acoustic Sleeve
- E. Fire-rated Conduit (Circuit Integrity) Wrap
 1. Endothermic wrap for EMT and RMC for protection of cable pathways for critical life safety circuits.
 2. Tested to ASTM E1725 for circuit integrity
 3. Manufacturer:
 - a. Specified Technologies – E-Wrap Endothermic Wrap

2.09 LABELS

- A. Machine-printed, thermal-transfer type with self-adhesive
- B. Text size for pathways shall be 3/8" tall.
- C. Manufacturer:
 1. Brady
 2. Dymo
 3. Hellermann Tyton
 4. Panduit
 5. Or equivalent

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. General pathway requirements have been identified in the Contract Documents through the use of general notes, key notes, symbols, details, and Division 27 specifications. Contractor is responsible for coordinating and providing required pathways to support all Division 27 Work in compliance with the Contract Documents. Coordinate exact pathway requirements with Subcontractors of all Division 27 Sections prior to Bid and include associated pathways in Bid.
- B. Refer to Section 27 00 10 for additional installation requirements.

3.02 CONDUIT / SLEEVES

- A. The minimum size conduit shall be 1-inch.
- B. EMT Conduit shall be used for all interior installations, unless otherwise noted.
 1. Where service provider entrance conduits do not enter the building in the same room the service provider cables will be terminated, entrance conduit routed within the building shall be IMC.
- C. PVC conduit shall only be installed in concrete or underground exterior of the building. Underground conduit bends and sweeps shall be IMC or RMC.
- D. For exposed conduit routing in Damp or Wet Locations (as defined by the NEC) or parking garages, conduit type shall be IMC or RMC with water-tight fittings and backboxes.
- E. Conduit shall be sized as indicated on the Technology drawings. If no conduit size is indicated, then conduits shall be a minimum of 1-inch in diameter and sized per TIA-569 – with maximum fill ratio of 40 percent.
- F. Conduits shall not have more than the equivalent of (2) 90 degree bends or 180 degrees without the installation of a pullbox or hand hole.
- G. For Interior Installations – conduits shall have a pull-box installed when the conduit exceeds 100 feet.
- H. For Exterior Underground Installations – conduits shall have a hand hole or maintenance hole installed when the conduit exceeds 500 feet.
- I. All conduits and sleeves shall be reamed after cutting to ensure there are no sharp edges or burrs on the conduit that could damage the cable.
- J. All conduits and sleeves shall have a nylon bushing installed on the open end(s) of the conduit.
- K. Conduits and sleeves shall not be shared with any other discipline unless specifically approved in writing by the Architect/Design Consultant.
- L. Contractor is responsible for field coordination to ensure conduits and sleeves are separated from electrical conduits, and steam or hot water pipes: maintain a minimum clearance of 12-inches where routed parallel.
- M. Unless indicated otherwise, all conduits shall be concealed under or within floor slabs, within finished walls, or above ceilings.
- N. All conduits shall be installed parallel with or at right angles to ceilings, walls, and structural members.
- O. Conduits shall be routed concealed in walls, above suspended ceilings, in concrete slabs, or below grade. Exposed conduit is allowed only in exposed-to-structure areas without suspended ceilings and where specifically noted by the Contract Documents.
- P. Restrictions Applicable to EMT
 1. Do not install underground.
 2. Do not encase in concrete, mortar, grout, or other cementitious materials.
 3. Do not use in areas subject to severe physical damage including but not limited to equipment rooms where moving or replacing equipment could physically damage the EMT.
 4. Do not use outdoors.
- Q. Install and bond in accordance with NFPA 70 and TIA-569. In addition, bond telecommunications conduit in accordance with

TIA-607.

1. Conduits that stub into Communications Rooms shall be bonded to Telecom Ground Bar in Communications Rooms. Utilize #6 AWG conductor for lengths up 13 feet, a #4 AWG conductor for lengths of 14 to 20 feet, and a #3 AWG conductor for lengths of 21 to 26 feet with listed two-hole compression or exothermic lugs at Ground Bar. Provide pipe grounding connector at conduit. Refer to TIA 607 standard for conductor size requirements for lengths longer than 26 feet.
- R. Conduit Through Floor Slabs - Where conduits rise through floor slabs, curved portion of bends shall not be visible above finished slab.
- S. Directional Changes in Conduit Runs
1. Make changes in direction of runs with symmetrical bends
 2. Make field-made bends and offsets with hickey or conduit-bending machine. Do not install crushed or deformed conduits.
 3. Prevent plaster, dirt, or trash from lodging in conduits, boxes and fittings during construction. Free clogged conduits of obstructions.
- T. Sleeves through floors shall be rigidly supported utilizing a cast-in-place as the preferred method or using a unistrut rack system and shall extend through either side of the ceiling/floor a minimum of 4-inches.
- U. Sleeves through walls shall be rigidly fastened to the studs and extend a minimum of 4-inches on either side.
- V. Install each conduit longer than 5 feet with a nylon pull string with a minimum tensile strength of 200 lbs.
- W. Conduit and Sleeve Supports
1. Support conduit and sleeves in underground installations using 2-inch duct spacers.
 2. Support conduit and sleeves in interior installations using pipe straps, wall brackets, hangers, or ceiling trapeze.
 3. Fasten by wood screws to wood; by toggle bolts on hollow masonry units; by concrete inserts or expansion bolts on concrete or brick; and by machine screws, welded threaded studs, or spring-tension clamps on steel work.
 4. Do not support conduit by ceiling support system. Conduit and box systems shall be supported independently of both (a) tie wires supporting ceiling grid system, and (b) ceiling grid system into which ceiling panels are placed.
 5. Supporting means shall not be shared between telecommunication raceways and electrical raceway, mechanical piping or ducts.
 6. Installation shall be coordinated with above-ceiling electrical and mechanical systems to assure maximum accessibility to all systems.
 7. Conduit and sleeves shall be supported by a trapeze or wall support brackets.
 8. A minimum of 3/8-inch all-thread shall be used for trapeze supports.
 9. Support in accordance with NFPA 70 at intervals not to exceed three feet from the box and every 10 feet afterwards.
 10. Conduit and sleeves shall be no less than 3-inches above a lay-in ceiling.
 11. Conduit and sleeves shall be rigidly supported and level.
 12. All supports shall attach to structure or a rigid surface.
 13. Supports shall not be shared with any other discipline unless specifically approved by the Architect/Design Consultant.
- X. Fabric Innerduct - - must use a swivel head(s) for installation.
1. If Contractor has not previously installed fabric innerduct, contact Cody Albin prior to installation for free installation support offered by the manufacturer: cody.albin@milliken.com, 512-388-7198.
 2. Contract shall use swivel head installation tool recommended by fabric innerduct manufacturer.

3.03 BACKBOXES

- A. Locknuts and Bushings
1. Fasten conduits to sheet metal boxes with two locknuts where required by NFPA 70, where insulated bushings are used, and where bushings cannot be brought into firm contact with the box; otherwise, use at least minimum single locknut and bushing.
 2. Locknuts shall have sharp edges for digging into wall of metal enclosures. Install bushings on ends of conduits, and provide insulating type where required by NFPA 70.
- B. Provide boxes in communication raceway systems at least every 100 feet and /or when 180 degrees in bends are exceeded when installing conduit on the interior of a building.
- C. Boxes for metallic raceways shall be cast-metal, hub-type when located in wet locations, when surface mounted on outside of exterior surfaces, or when surface mounted on interior walls exposed up to 7 feet above floors and walkways, and when specifically indicated.
- D. Boxes in other locations shall be sheet steel, except that aluminum boxes may be used with aluminum conduit, and nonmetallic boxes may be used with nonmetallic conduit system.
- E. Boxes for telecommunications shall be minimum 4 11/16 inches square and 2 1/8 inches deep.
- F. Boxes for use in masonry-block or tile walls shall be square-cornered, tile-type, or standard boxes having square-cornered, tile-type covers.
- G. Provide gaskets for cast-metal boxes installed in wet locations and boxes installed flush with outside of exterior surfaces.
- H. Backbox Supports

1. Backboxes installed in a sheet rock wall or ceiling shall be supported using the Caddy box mounting bracket or equivalent.
2. Support boxes installed flush in suspended ceilings tiles with T-bar bracket/bridge connected to ceiling grid.
3. Fasten boxes and supports with wood screws on wood, with bolts and expansion shields on concrete or brick, with toggle bolts on hollow masonry units, and with machine screws or welded studs on steel. Threaded studs driven in by powder charge and provided with lock washers and nuts or nail-type nylon anchors may be used in lieu of wood screws, expansion shields, or machine screws. In open overhead spaces.
4. Boxes installed in a wall shall be flush with the wall upon completion.
5. Mounting Heights of Boxes
 - a. Mount telecommunications outlets at height(s) as indicated on the Technology Drawings.

3.04 FLOORBOXES / POKE THRU DEVICES

- A. Coordinate insert requirements with Division 26 prior to Pre-Construction Submittal.
- B. Indicate conduit stub-up location on pre-construction shop drawings and as-built drawings.

3.05 PULLBOXES / JUNCTION BOXES

- A. Support sheet metal boxes directly from building structure or by bar hangers.
- B. Boxes mounted overhead shall be no more than 5 feet above accessible (lay-in) ceiling.
- C. Pullboxes for concealed conduits routed above inaccessible ceiling shall be accessible via an access panel. Confirm acceptable location in writing with Architect/Design Consultant prior to installation. Review reflected ceiling plans prior to Bid and include associated costs for additional access panels for required pullboxes for communications conduit with Bid.
- D. Pull boxes or Junction boxes shall not be use for changing the direction of cable travel. Sweeps will be placed before or after the pull box / junction box to allow for the change in direction
 1. Access panels shall be 30" by 30"; color, style, manufacturer as approved by Architect.
- E. Size pullboxes per the following table:

Conduit Trade Size	Width	Length	Depth	Width Increase for Additional Conduit (of same size)
1"	4"	4"	2-1/8"	Not applicable
1-1/4"	6"	20"	3"	3"
1-1/2"	8"	28"	4"	4"
2"	8"	36"	4"	5"
2-1/2"	10"	42"	5"	6"
3"	12"	48"	5"	6"
4"	16"	60"	8"	6"

F. Transition Point Enclosure

1. Where conduit for slab-on-grade floorboxes is not routed underground to serving Communications Rooms – and instead stubs up into accessible ceiling space - a transition point enclosure is required.
2. Transition Point Enclosure requirements:
 - a. 24" x 12" x 12" (minimum size) NEMA 1 enclosure with 1RU, 2RU, or 3RU wall bracket (Chatsworth 11583-719, Middle Atlantic VPM-2, or equal).
 - b. Enclosure shall be located above accessible (lay-in) ceiling.
 - c. Conduit from floorbox shall stub directly into enclosure.
 - d. Provide knockout bushings for number of 1" knockouts to support number of cables installed.
 - e. Each Transition Point Enclosure can support multiple floorboxes, up to 20 total Category cables.

3.06 SURFACE RACEWAYS AND BOXES

- A. Surface Raceways and Boxes are not allowed, except where specifically identified on the Drawings.
- B. Where surface raceway meets the ceiling, provide "boot" accessory.
- C. Attach back part of surface raceway to wall every 4 feet or less with screw or other appropriate form of permanent installation. Use of adhesive to mount raceway to the wall is prohibited.
- D. Pull boxes or Junction boxes shall not be use for changing the direction of cable travel. Sweeps will be placed before or after the pull box / junction box to allow for the change in direction

3.07 WIRE-MESH CABLE TRAY

- A. Coordinate with all other disciplines to ensure cable tray routing and installation is coordinated with other systems.
- B. Coordination with all other disciplines to ensure the 12-inch clearance above the tray is maintained.
- C. Any elevation changes shall have radius drops installed to support the cables properly.
- D. Install cable trays parallel with or at right angles to ceilings, walls, and structural members. Utilize 45-degree off-sets/routing to change elevation and horizontal routing.
- E. Provide supports to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction.

- F. Where cable trays encounter a non-fire-, smoke-, or acoustically-rated wall, cut opening through wall to facilitate continuous cable tray installation through wall.
- G. Where cable trays encounter fire, smoke, or acoustically-rated wall, stop cable tray and provide Fire-or Smoke-Rated Pathway Devices. Provide number of devices to match square-inch capacity of cable tray. Devices shall be ganged together with manufacturer-specific accessory.
- H. Where cable trays encounter more than 10 feet of inaccessible (gypsum board) ceiling, stop cable tray and provided number of 4" conduits over inaccessible ceiling to match square-inch capacity of cable tray, per the following table:

Cable Tray Size	Quantity of 4" Conduits
2"x8"	2
2"x12"	3
4"x12", 2"x24"	4
4"x18", 6"x12"	5
4"x24", 6"x18"	7
6"x24"	10

- I. Ground and bond cable tray in accordance with NFPA 70, TIA-607, and NECA/BICSI-607.
 - 1. Bond cable tray to the Telecom Ground Bar in each Communications Rooms. Utilize #6 AWG conductor for lengths up 13 feet, a #4 AWG conductor for lengths of 14 to 20 feet, and a #3 AWG conductor for lengths of 21 to 26 feet. Refer to TIA 607 standard for conductor size requirements for lengths longer than 26 feet.
 - 2. Provide ground lugs between each section of cable tray to ensure electrical continuity of cable tray installation. Where cable tray sections are separated by conduit or firestopping sleeves, provide #6 AWG bonding jumper between cable tray sections.
- J. Cable Tray Supports
 - 1. Cable tray shall be supported by a trapeze or wall support brackets. No center support brackets shall be allowed.
 - 2. A minimum of 3/8-inch all-thread shall be used for trapeze supports.
 - 3. Support in accordance with manufacturer recommendations but at not more than 10 foot intervals.
 - 4. Cable tray shall be no less than 3-inches above a lay-in ceiling.
 - 5. Cable tray shall be rigidly supported and level.
 - 6. All-thread shall be covered from the attachment to the trapeze system to 3-inches above the tray to protect the cables from being chaffed.
 - 7. All supports shall attach to structure or a rigid surface such as a plywood backer in a sheet rock wall.
 - 8. Supports shall not be shared with any other discipline.
 - 9. Cable trays shall be installed outside of communications rooms for 20' in either direction

3.08 FIRESTOPPING

- A. Fire-Rated Pathway Devices
 - 1. Provide Fire-Rated Pathway Device(s) wherever Communications cabling routed above accessible ceiling needs to be routed through a fire-rated wall. Quantity and size of devices shall be sized per manufacturer's published cable fill counts, leaving 25% spare capacity.
 - 2. Coordinate quantity, size and locations with other Division 27 Subcontractors and indicate quantity, size, location, product make and model number, and UL System number on Pre-Construction Shop Drawings.
 - 3. Coordinate quantity, size and locations with other Division 27 Subcontractors and indicate quantity, size, location, product make and model number, and UL System number on Pre-Construction Shop Drawings.
 - 4. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
- B. Firestopping for Conduits
 - 1. Provide firestopping components as part of a UL System for all conduit penetrations through fire-rated and smoke-rated walls and floors.
 - 2. Coordinate locations and UL System with other Division 27 Subcontractors and indicate locations and UL System number on Pre-Construction Shop Drawings.
 - 3. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
- C. Firestopping for Backboxes
 - 1. Provide firestopping component(s) as part of a UL tested/approved solution for backboxes located in fire-rated and smoke-rated walls.
 - 2. Coordinate locations with other Division 27 Subcontractors and indicate locations on Pre-Construction Shop Drawings.
- D. Smoke-Rated / Acoustical Pathway Device
 - 1. Provide Smoke-Rated Pathway Device(s) wherever Communications cabling routed above accessible ceiling needs to be routed through a smoke-rated wall or through a wall of a Noise Critical Room.

2. Quantity and size of devices shall be sized per manufacturer's published cable fill counts, leaving 25% spare capacity.
 3. Coordinate quantity, size and locations with other Division 27 Subcontractors and indicate quantity, size, location, product make and model number, and UL System number on Pre-Construction Shop Drawings.
 4. For smoke-rated partitions: Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
- E. Fire-rated Conduit (Circuit Integrity) Wrap
1. Provide Fire-rated Conduit (Circuit Integrity) Wrap for certain Communications conduits for the following systems:
 - a. Section 275129 Two-Way Communications System
 - b. Section 275319 Emergency Responder Radio Coverage (ERRC) DAS
 2. Coordinate conduit size and lengths requiring wrap with Subcontractors of those sections prior to Bid and include cost to provide that wrap in the Bid.

3.09 LABELING

- A. Wherever communications conduits stub up into Communications Room, either through the floor or wall), provide label on bottom/front half of conduit indicating communications system and far end location. Example: DATA FROM FRONT DESK FLOORBOX. At far end of these conduits, provide label indicating communications system and room name and room number. Example: DATA TO MDF 123.
- B. Wherever communications conduits are installed overhead due to runs over inaccessible ceilings, provide label on bottom half of conduit at each end of the conduit indicated communications system and far end location. Example: HORIZONTAL CABLE TO LOBBY 251.
- C. Provide label on cover of each pullbox / junction box identifying communications system cabling and destinations. Example: BACKBONE CABLE FROM MDF 123 TO IDF 456.

3.10 FUNCTIONAL AND PERFORMANCE TESTING

- A. Refer to Section 27 00 10 for general Functional and Performance Testing requirements.
- B. The following additional testing requirements shall be provided:
 1. Cable Tray Two-Point Ground/Continuity Testing
 - a. Prior to the two-point ground testing, a visual inspection shall be performed to verify that the bonding and grounding system is installed according to the Contract Documents and in compliance with the TIA-607 Standard.
 - b. All testing shall be conducted prior to any active equipment being installed.
 - c. The Contractor shall use an earth ground resistance tester that is configured for a continuity test. This is also known as a two-point tester or a "dead earth" test.
 - d. Prior to the two-point continuity test conduct a voltage test to ensure there is no stray voltage in the system.
 - e. The testing shall include but is not limited to the following points.
 - 1) Cable tray to electrical ground in ER/TR.
 - 2) Cable tray to the building steel (if present).
 - 3) Cable tray to each SBB/TGB.
 - f. Per the TIA-607, the maximum value for resistance between any point in the telecommunications bonding and grounding system and the building's electrical grounding electrode system is 100 milliohms. In the case of long conductor runs, the resistance of the conductor must be factored into the total resistance. For example 1 km of a No. 3/0 conductor has a resistance of 0.2028 ohms. (0.06180 ohms per 1000 ft.)

3.11 FIELD OBSERVATIONS

- A. Refer to Section 27 00 10 for Field Observation requirements.

3.12 DEMONSTRATION, TRAINING, AND ADJUSTMENTS

- A. Refer to Section 27 00 10 for general Demonstration, Training, and Adjustment requirements.
- B. Provide the following additional requirements:
 1. Conduct (1) 1-hour site walk with Owner after pathways have been installed but prior to installation of suspended ceiling; point out pathway and pull box locations.

3.13 MAINTENANCE

- A. Refer to Section 27 00 10 for Warranty Service and One Year Warranty Check requirements.

END OF SECTION 270533

SECTION 271000 - STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

- 1.01 This section identifies the requirements, technical design, and specifications for the structured cabling system at the Fort Bend ISD Triplex, located in Sugar Land, Texas ("Owner"). The structured cabling system as specified is an Industry-Standard Category 6 and 6A structured cabling system and includes backbone cabling, horizontal cabling and equipment room hardware as specified.
- 1.02 The Contractor shall provide a Panduit Manufacturer's 25-Year Performance Certification for the installed structured cabling system.
- 1.03 Contractor shall include materials, equipment, and labor necessary to provide a complete and functional structured cabling system regardless of any items not listed or described in this specification or associated drawings.
- 1.04 Requirements Table of Content
- 1.5 Contractor Experience Requirements
 - 1.6 Submittal Requirements
 - 2.2 Acceptable Manufacturers
 - 3.1 Codes, Standard, and Regulations
 - 3.3 General Requirements
 - 3.4 System Requirements
 - 3.5 Testing Requirements
 - 3.6 Project Closeout Documentation
- 1.05 RELATED REQUIREMENTS
- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 27 and shall be complied with in every respect. The Contractor shall examine all of the items which make up the Contract Documents and shall coordinate them with the work on the project.
 - B. Contractor Experience Requirements
 - 1. The Contractor shall be a Panduit Gold Certified prior to submitting a bid for the work.
 - 2. The Contractor shall possess all relevant Manufacturer Certifications (i.e. structured cable systems, testing equipment, etc.,) for both the company and individual technicians and full time employees of the company, prior to submitting a bid for the work,
 - 3. The Contractor's Project Manager shall be a Registered Communications Distribution Designer (RCDD), **full-time employee of the company** and at all onsite coordination meetings.
 - 4. The Contractor shall have a minimum of (2) certified BICSI Installers, full-time employees of the company and on onsite at all times.
 - 5. At a minimum the RCDD and BICSI certified technicians shall be present at the following meetings:
 - a. Preconstruction low voltage kick off
 - b. Telecommunications room mock up
 - c. Other meetings noted above.
 - 6. The Contractor shall have been in business for a minimum of five (5) years.
 - 7. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.
 - 8. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
 - C. Before the installation and rough-in of conduits for technology and audiovisual outlets in the typical classroom the Contractor shall mock up one classroom and one lab with respect to power, data, and audiovisual backboxes rough-ins for approval by the OAC team.
 - D. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.
- 1.06 SUBMITTAL REQUIREMENTS
- A. Pre-Installation Submittal
 - 1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Design Consultant.
 - 2. Contractor shall ensure submittals are submitted in a timely manner to ensure all products can be ordered and received on site in order to not cause any delays. If there are any concerns with any products having long lead times, those products shall be clearly identified in writing so the review and approval can be expedited.
 - 3. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e. product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.
 - 4. Manufacturer product data sheets for each proposed system component.

- a. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified will not be approved.
- 5. Manufacturer Product Certifications for Company.
- 6. Manufacturer Product Certifications for Installers.
- 7. Manufacturer Certifications for testing equipment technicians.
- 8. Manufacturer Certifications for testing equipment calibration.
- 9. RCDD Certificate for Contractor's Project Manager.
- 10. BICSI Certificate for Contractor's (2) Onsite Installers.
- 11. Manufacturer Warranty letter.
- 12. Documentation indicating that Contractor has been in business for (5) years.
- 13. Address of Contractor's local office within a 75-mile radius of the project site.
- 14. Quantity of full-time local technicians within a 75-mile radius of the project site.
- 15. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
- 16. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.
- B. Architect/Design Consultant will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- C. Proposed equivalent items must be approved in writing by the Architect/Design Consultant prior to purchase or installation. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.
- D. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.
- E. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.
- F. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
- All wiring, equipment, and installation materials shall be new and of the highest quality.
- Labels on all cabling, materials, and equipment must indicate a nationally recognized testing laboratory.
- I. Original Equipment Manufacturer (OEM) documentation must be provided to the Architect/Design Consultant which certifies performance characteristics and compliance with ANSI/TIA/EIA 568-C standards.
- J. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect/Design Consultant prior to submitting a proposal for this work. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues and the Contractor will have all products on-site when needed to complete the job as required.

2.02 ACCEPTABLE MANUFACTURERS

- A. Fiber Optic Backbone Cable
 - 1. Indoor/Outdoor Fiber Optic Cable
 - a. 6 Fiber Cable, OM3, Indoor/Outdoor Armored TB, Plenum, 900um Buffered
 - 1) Panduit Part Number – FOLPX06
 - 2) Corning Equivalent
 - b. 12 Fiber Cable, OM3, Indoor/Outdoor Armored TB, Plenum, 900um Buffered
 - 1) Panduit Part Number – FOLPX12
 - 2) Corning Equivalent
 - 2. Fiber Optic Innerduct
 - a. Outdoor (Orange)
 - 1) MaxCell 2-inch, 3-Cell – Part Number – MXED52223XXYYYY
(XX=color, YYYY=Length)
 - 2) MaxCell 3-inch, 3-Cell – Part Number – MXED64283XXYYYY
(XX=color, YYYY=Length)

- 3) MaxCell 3-inch, 3-Cell – Part Number – MXD64283XXXXXX
(XX=color, YYYY=Length)
- B. Copper Backbone Cable
 - 1. Indoor/Outdoor
 - a. (3) Indoor/Outdoor Copper Cable, category 6, UTP, 4-pair, 24 AWG, black (Black Sheath)
 - b. CommScope Part Number – CS34P-IO
 - c. Belden Cable Part Number – 2146A
- C. Horizontal Cable
 - 1. Category 6 UTP Plenum
 - a. Network Access (Blue Sheath)
 - 1) Panduit TX6000 Part Number – PUP6004BU-UY
 - 2) General GenSPEED 6 Part Number – 7131900
 - 3) Commscope Part Number CS37P BLU
 - 4) Belden Cable Part Number 4813 D15A1000
 - b. Wireless Access Points (Green Sheath) Cat 6A
 - 1) Panduit TX6A Part Number – PUP6XHD04GR-G
 - 2) General GenSPEED 10 MTP Gen 5 Part Number – 7151853
 - 3) Commscope Part Number 2091B GRN
 - 4) Belden Cable 10GXW13 0051000
 - c. IP Security Camera (Orange Sheath)
 - 1) Panduit TX6000 Part Number – PUP6004OR-UY
 - 2) General GenSPEED 6 Part Number – 7131905
 - 3) Commscope Part Number CS37P ORG
 - 4) Belden Cable Part Number 4813 003A1001 (minimum 5,000' order)
 - 2. Category 6 UTP Flooded
 - a. Indoor/Outdoor Copper Cable, category 6, UTP, 4-pair, 24 AWG, black (Black Sheath)
 - 1) CommScope Part Number – CS34P-IO
 - 2) Belden Cable Part Number – 2146A
- D. Fiber Optic Cable Termination
 - 1. 4RU Fiber Enclosure
 - a. Panduit 4RU Rack Mounted Fiber Optic Enclosure – Part Number FRME4
 - b. Corning Equivalent
 - 2. 2RU Fiber Enclosure
 - a. Panduit 2RU Rack Mounted Fiber Optic Enclosure – Part Number FRME2U
 - b. Corning Equivalent
 - 3. 50µm Multi-Mode Fiber Adapter Plate
 - a. Panduit 50um Multimode 10Gig OM3/4, LC, 6 fibers, Zirconia Ceramic Sleeve Aqua
 - 1) Panduit - Part Number – FAP3WAQDLCZ
 - 2) Corning Equivalent
 - b. Panduit 50um Multimode 10Gig OM3/4, LC, 12 fibers, Zirconia Ceramic Sleeve Aqua
 - 1) Panduit - Part Number – FAP6WAQDLCZ
 - 2) Corning Equivalent
 - 4. Fiber Blank Plate
 - a. Panduit Blank Metal Adapter Plate – Part Number FAPB
 - b. Corning Equivalent
 - 5. 50µm Multi-Mode pig-tail LC Connectors
 - a. Panduit OM3, 1 fiber, 900µm buffered fiber, LC to pigtail multimode simplex pigtail – Part Number – FX1BN1NNNSNM001
 - b. Corning Equivalent
 - 6. Loose Tube Fiber Fan-Out Kit
 - a. Panduit 36" Fiber Optic Fan-Out Kit, 12-fiber – Part Number – FO12CB
 - b. Corning Equivalent
 - 7. Fiber Optic Slice Module
 - a. Panduit – FOSMF
 - b. Corning Equivalent
 - 8. Fiber Optic Fusion Splice Sleeves
- E. Copper Cable Termination
 - 1. Building Entrance Terminals

- a. Category 6 / 6A POE Rated Lightning Protection
 - 1) Field End
 - a) DITEK Part Number – DTK-MRJPOES
 - b) DITEK CAT 6A POE Part Number – DTK-MRJETHS
 - 2) Equipment Room/Telecommunications Room End
 - a) Rack Mount Face Plate up to 12 Ports – DITEK Part Number – DTK-VM12RM
 - (i) Hinged Wall Mount Bracket 2RU – WBH2
 - (ii) Panduit Rack Cabling Manager - Part Number – NMF1
 - (iii) DITEK Versa-Module Power Over Ethernet Surge Protector-DTK-VM45POE
 - (iv) DITEK Versa-Module Plug – DTK-RM12FPPLUG for unused ports on the patch panel
 - b) Wall Mount Face Plate up to 6 Ports – DITEK Part Number – DTK-VM6WM
 - (i) DITEK Versa-Module Power Over Ethernet Surge Protector- DTK-VM45POE
 - (ii) DITEK Versa-Module Plug – DTK-RM12FPPLUG for unused ports on the patch panel
 - c) DITEK CAT 6 POE – DITEK Part Number – DTK-MRJPOEM
 - d) 10 Gigabit Category 6A PoE Surge Protector – DTK-110RJC6APOE
 - e) DITEK CAT 6A POE Part Number – DTK-MRJETHS
 - f) Contractor shall place WBH2 and DITEK’s Equipment on the wall behind rack of WAPs and security camera patch panels.
 - g) Contractor shall terminate all osp, and indoor/outdoor cat6 / 6A cables for exterior security cameras and wireless access point to the DITEK’s appropriate equipment.
 - h) Contractor shall coordinate with FBISD IT Department for the installation of the cables from DITEK’s appropriate equipment to the owner’s network switch.
2. Backbone Cable Termination Panels
 - a. Rack Mounted Voice Patch Panels
 - 1) Panduit Cat 6 1RU 24-Port angled patch panel– Part Number DPA245E88TGY
 - a) Two IDF’s per 24 port patch panel, terminate 1 pair per port.
*Example: (1) 24 port patch panel: IDF#1 = ports 1-12, IDF #2 = ports 13-24
 - b. Strain Relief Bar
 - 1) Panduit Strain relief bar extends 5 inches off the rack to support and manage cables Part Number - SRB19D5BL
 - c. Termination Block Kit Components
 - 1) Panduit 5e 110-Style Wall-Mount Wiring Block Kit w/ Legs, 100-Pair – Part Number – P110KB1004Y
 - d. Jumper Trough with Legs
 - 1) Part Number - P110JTW-X
3. Horizontal Cable Termination Panels
 - a. Rack Mounted Data Patch Panels
 - 1) Category 6 2RU 48-Port Unloaded Angled Patch Panels Part – Number CPPA48FMWBLY
 - 2) Category 6A 2RU 48-Port Unloaded Angled Patch Panels Part – Number CPPA48FMWBLY
 - b. Strain Relief Bar
 - 1) Panduit Strain relief bar extends 5 inches off the rack to support and manage cables Part Number - SRB19D5BL
 - c. Blank Inserts (Black)
 - 1) Panduit Mini-Com Blank Module for unused ports – Part Number – CMBBL-X
4. Category 6/6A Modular Jacks
 - a. Network Access
 - 1) Equipment Room/Telecommunications Room End (Blue)
 - a) Panduit Mini-com TX6 Plus UTP Jack Modules Part No. CJ688TGBU
 - 2) Field End (Blue)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGBU
 - b. Wireless Access Points (Cat 6A)
 - 1) Equipment Room/Telecommunications Room End (Green)
 - a) Panduit Mini-Com Cat 6A UTP Jack Modules Part No. CJ6X88TGGR
 - 2) Field End (Green)
 - a) Panduit Mini-Com Cat 6A UTP Jack Modules Part No. CJ6X88TGGR
 - c. IP Security Camera
 - 1) Equipment Room/Telecommunications Room End (Orange)
 - a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGOR
 - 2) Field End (Orange)

- a) Panduit Mini-Com TX6 Plus UTP Jack Modules Part No. CJ688TGOR
 - d. Wet Areas
 - 1) Field End
 - a) Category 6, RJ45, black industrial bulkhead connector with protective cover Part Number - IAEBH6
- F. Telecommunications Faceplates with Designation Window
 - 1. 6-Port Single Gang Flush
 - a. Panduit Mini-Com Stainless Steel Faceplates with Labels Part No. CFPL6SY
 - b. Panduit Mini-Com Executive Series Single Gang Faceplates with Labels Part No. CFPE6WHY
 - *Contractor shall coordinate with owner/architect prior to purchase of Panduit faceplates.
 - 2. 4-Port Single Gang Flush
 - a. Panduit Mini-Com Stainless Steel Faceplates with Labels Part No. CFPL4SY
 - b. Panduit Mini-Com Executive Series Single Gang Faceplates with Labels Part No. CFPE4WHY
 - *Contractor shall coordinate with owner/architect prior to purchase of Panduit faceplates.
 - 3. Wall Phone Single Gang Plate
 - a. Panduit Stainless steel phone plate with Giga-TX™ Style Category 6 Keystone Jack Module. Part Number KWP6PY
 - 4. 2-Port Surface Mount Box (White)
 - a. Panduit Mini-Com Surface Mount Box Part No. CBX2WH-A
 - 5. 4-Port Surface Mount Box (White)
 - a. Panduit Mini-Com Surface Mount Box Part No. CBX4WH-A
 - 6. Blank Insert (White)
 - a. Panduit Mini-Com Blank Module – Part No. CMBWH-X
 - 7. QuickPort In-Ceiling Bracket with Drop Ceiling Clip
 - a. Leviton - QuickPort In-Ceiling Bracket – Part No. 49223-CBC
- . Equipment Racks, Cabinets, Cable Management, and Accessories
 - 1. Two-Post Rack - 19" x 84" Open Frame (Black)
 - a. Panduit – Part Number R2P
 - 2. Vertical Cable Managers (Black)
 - a. Panduit 10" Double Sided Vertical Cabling Section - Part Number – PR2VSD10
 - 3. Horizontal Cable Managers (Black)
 - a. Panduit Rack Cabling Manager - Part Number - NMF2
 - 4. Vertical Power Strip for 7' Equipment Rack with standoff brackets
 - a. Tripp-Lite Vertical Power Strip with Meter and– Part Number PDUMV30HVNETLX
 - b. Panduit Vertical PDU Mounting Bracket – Part Number R2PPDUB
 - *Vertical power strip and standoff bracket shall not interfere with the network switches.
- . Cable Runway (Ladder Type)
 - 1. Universal Cable Runway
 - a. 12-inch Chatsworth - Part Number 10250-712
 - b. 18-inch Chatsworth - Part Number 10250-718
 - 2. Cable Runway Radius Drop, Cross Member
 - a. 12-inch Chatsworth - Part Number 12100-712
 - b. 18-inch Chatsworth - Part Number 12100-718
 - 3. Cable Runway Radius Drop, Stringer
 - a. Chatsworth - Part Number 12101-711
 - 4. Cable Runway Butt-Splice Kit
 - a. Chatsworth - Part Number 11301-701
 - 5. Cable Runway Junction-Splice Kit
 - a. Chatsworth - Part Number 11302-701
 - 6. Cable Runway Butt-Swivel Splice Kit
 - a. Chatsworth - Part Number 10487-701
 - 7. Rack-to-Runway Mounting Kit
 - a. 9 to 12-inch runway Chatsworth - Part Number 10595-712
 - b. 15 to 18-inch runway Chatsworth - Part Number 10595-718
 - 8. Cable Runway Elevation Kit for Racks
 - a. Chatsworth - Part Number 10506-706
 - 9. Cable Runway Elevation Kit for Cabinets
 - a. Chatsworth - Part Number 10506-706
 - 10. Triangular Support Bracket, Aluminum

- a. 6 to 12-inch runway Chatsworth - Part Number 11312-712
- b. 12 to 18-inch runway Chatsworth - Part Number 11312-718
- 11. Wall Angle Support Kit, Cable Runway
 - a. 12-inch runway Chatsworth - Part Number 11421-712
 - b. 18-inch runway Chatsworth - Part Number 11421-718
- 12. 90 Degree Runway-Splice Kit
 - a. Chatsworth - Part Number 11314-701
- 13. 45 Degree Runway-Splice Kit
 - a. Chatsworth - Part Number 11313-701
- 14. Foot Kit, Cable Runway
 - a. Chatsworth - Part Number 11309-701
- 15. Vertical Wall Brackets (pair)
 - a. Chatsworth - Part Number 10608-701
- 16. Threaded Ceiling Kit, Cable Runway
 - a. Chatsworth - Part Number 11310-001
- 17. Threaded Rod Cover
 - a. Chatsworth - Part Number 11085-001
- 18. Protective End Caps for Cable Runway
 - a. Chatsworth - Part Number 10642-001
- 19. End Closing Kit, Cable Runway
 - a. Chatsworth - Part Number 11700-712
 - b. Chatsworth - Part Number 11700-718
- I. Pathway Cable Support
 - 1. Panduit J-Mod Cable Support System
 - 2. Erico – CADDY CAT LINKS J-Hook Series
 - 3. Wyr-Grid – WG12BL10 (minimum)
 - a. Contractor to shall use associated transitions, hardware to provide solid support and grounding (sized appropriately according to manufacture specifications) to be used outside the MDF/IDF and a minimum of 20' in any direction cabling trunks leave MDF/IDF. The 20' requirement is for cable tray not j-hooks.
 - b. Wire basket tray clearances:
 - 1) Shall have a 3"-6" clearance from ceiling tile to the bottom of basket tray and Shall have minimum of 12" clearance from the top of the basket tray to HVAC Units, HVAC duct, heating ducts, and heating equipment, etc. Shall have minimum of 12" clearance on the side of the basket tray to HVAC Units, HVAC duct, heating ducts, and heating equipment, etc
 - 2) Shall be accessible with the use of 12'-0" (MAX) A-frame ladder
 - c. Wire basket tray shall be properly grounded and bonded as per industry standards.
- J. Grounding and Bonding
 - 1. MDF A118 Grounding Bus Bar, 20"
 - a. Panduit Part Number - GB4B0624TPI-1
 - b. Chatsworth - Part Number 40153-020
 - 2. IDF Grounding Bus Bar, 12"
 - a. Panduit Part Number - GB4B0612TPI-1
 - b. Chatsworth - Part Number 13622-012
 - 3. Grounding strip
 - a. Panduit Part Number - RGS134-1Y
 - 4. Equipment Bonding Jumper
 - a. Panduit Part Number - GJS6xxU (GJS660U)
*xx – denotes length
 - 5. Cable Runway Ground Strap Kit
 - a. Chatsworth - Part Number 40164-001
 - 6. Compression Lugs
 - a. Panduit - Part Number - LCC6-14JAWH-L
 - 7. #6 AWG Solid Green Insulation Ground Wire
 - a. Superior Essex - Part Number 12-018-04
 - 8. #3/0 Stranded Green Insulation Ground Wire
 - 9. Cable Sheath Bonding Clamp
- . Labeling
 - 1. Permanent Labels for Fiber Optic Cables

- a. Laser/Ink Jet Self Laminating Labels
 - 1) Panduit Part Number Series – S100X*****
- 2. Permanent Labels for Copper Cables
 - a. Laser/Ink Jet Self Laminating Labels
 - 1) Panduit Part Number Series – S100X*****
- 3. Permanent Labels for Backbone Fiber Optic Cables
 - a. Self-Laminating Fiber Optic Cable Marker Tags
 - 1) Panduit Part Number – PST-FO
- 4. Permanent Labels for Innerduct
 - a. Self-Laminating Fiber Optic Cable Marker Tags
 - 1) Panduit Part Number – PST-FO
 - *To be used for Innerduct with fiber installed.
 - 2) Panduit Part Number – PST-FOBLNK
 - *To be used for empty spare Innerduct
- 5. Permanent Labels for Patch Panels and Ceiling Grid
 - a. Panduit Component Label
- 6. Permanent Labels for Faceplates and Ceiling Grid
 - a. Panduit Component Label
- 7. Permanent Labels for Grounding Cables
 - a. Laser/Ink Jet Self Laminating Labels
 - 1) Panduit Part Number Series – S100X*****
- Fire Stop
 - 1. STI Spec Seal Part Number
 - a. MDF A118/IDF - EZ-Path 44+Series
 - a. EZ-Path
 - 2. SpecSeal Fire Stop Products (SSP)
 - b. Sleeves - Series SSP Fire Stop Putty - Part Number – SSP100
- M. Plywood
 - 1. 8' H x 4' W x 3/4" Sheets of BC grade fire-rated plywood
- N. Fire Retardant Paint (White)
- . Fiber Patch Cables
 - 1. Multi-Mode Fiber Patch Cords
 - a. Panduit LC - LC MM Fiber Optic Patch Cords Part Number - FXE10-10M3Y
 - b. Corning Equivalent
 - *Contractor shall confirm with the owner lengths, colors and quantities prior to purchase.
 - c. Provide a minimum of one patch for every terminated strand of fiber.
- P. Copper Patch Cables
 - 1. Panduit TX6 Plus Category 6 /6A UTP Patch Cord – Part Number UTPSPxxzzY (cat 6) UTP28X (cat 6A)
 - *xx – denotes length, *zz denotes color other than off white
 - a. Panduit - Data/Voice (Blue) Part Number -UTPSP10BUY
 - b. Panduit – Wireless Access Point (Green) Cat 6A Part Number -UTP28XxxGR
 - c. Commscope – Exterior Wireless Access Point (OSP) Cat 6A – Part Number –C015582
 - 1) For Exterior Patch Cables, Contractor to provide a recommended length from terminated category cable to exterior equipment.
 - d. Panduit – Security Camera (Orange) Part Number -UTPSP10ORY
 - e. Commscope – Security Exterior Camera (OSP) Part Number – PCOSP-6U-BK
 - 1) For Exterior Patch Cables, Contractor to provide a recommended length from terminated category cable to exterior equipment.
 - f. Panduit – Kronos, HVAC, and DSX (Violet) Part Number -UTPSP10VLY
 - *Contractor shall confirm with the owner lengths, colors and quantities prior to purchase.
 - g. Provide a minimum of two patch for every terminated category cable.

PART 3 - EXECUTION

3.1 CODES, STANDARDS, REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire
 - 2. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

3. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
4. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
 1. Telecommunications Distribution Methods Manual 13th Edition
 2. Outside Plant Design Reference Manual 5th Edition
 3. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
 4. NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 5. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Electronics Industry Alliance (EIA)
- F. Federal Communications Commission (FCC)
 1. FCC Part 15, Radiated Emissions Limits, revised 1998
 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 3. FCC Part 76, Cable Television Service, revised 1998
- G. Insulated Cable Engineers Association (ICEA)
 1. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable
 2. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors
 3. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- H. International Electrotechnical Commission (IEC)
- I. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
 1. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 2. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive
 3. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
 4. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code
 5. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
- J. International Organization for Standardization (ISO)
 1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
 2. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14763-1, Information Technology-Implementation, and Operation of Customer Premises Cabling-Administration, 1999
 4. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 5. ISO/IEC 14763-1, Information Technology-Implementation, and Operation of Customer Premises Cabling-Administration, 1999
- K. National Cable Television Association (NCTA)
- L. National Electrical Manufacturers Association (NEMA)
 1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
- M. National Fire Protection Association (NFPA)
 1. NFPA-70, National Electrical Code
 2. NFPA-75, Protection of Electronic Computer Data Processing Equipment.
 3. NFPA-101, Life Safety Code
 4. NFPA-297, Guide on Principles and Practices for Telecommunications Systems
 5. NFPA-780, Standard for the Installation of Lightning Protection Systems.
- N. National Institute Standards and Technology (NIST)
- O. Occupational Safety and Health Administration (OSHA)
- P. Telecommunications Industry Association (TIA)
 1. ANSI/TIA-568.0-D-1, Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA -568.0-D.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
 4. ANSI/TIA-568.3-D-1, Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure.
 7. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
 8. ANSI/TIA-758-B, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.

- Q. U.S. Department of Agriculture (USDA)
 - 1. RUS 1755 Telecommunications Standards and Specifications for Materials, Equipmen, and Construction
 - 2. RUS Bull 1751F-643 (2002) Underground Plant Design
 - 3. RUS Bull 1751F-815 (1979) Electrical Protection of Outside Plant
 - 4. RUS Bull 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)
 - 5. RUS Bull 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)
 - 6. RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)
 - 7. RUS Bull 345-72 (1985) Filled Splice Closures (PE-74)
 - 8. RUS Bull 345-83 (1979; Rev Oct 1982) Gas Tube Surge Arrestors (PE-80)
- R. Underwriters Laboratories, Inc. (UL)
 - 1. UL 510 (2005; Rev thru Aug 2005) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
 - 2. UL 910 (NFPA 262 1990) Applicable Flame Test

3.2 In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Architect/Design Consultant in writing of any such occurrences before purchasing or installing any equipment or materials. The Architect/Design Consultant will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to design changes, equipment, materials and/or installation changes. In any event, Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Code, the more stringent shall take precedence.

3.3 GENERAL REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of Texas, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Design Consultant for direction before proceeding with that part of the work.
- B. The Contractor shall be responsible for coordination with other trades to ensure any conflicts or potential conflicts are resolved prior to any work beginning on the project.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.
- D. No deviations from the plans or specifications shall be made without full consent in writing of the Architect/Design Consultant. The Contractor shall have written approval from the Architect/Design Consultant for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Design Consultant prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- E. The Contractor shall obtain written permission from the Architect/Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.
- F. Contractor shall notify the Architect/Design Consultant a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Design Consultant to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- G. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- H. Equipment and materials installed by the Contractor shall be free of defects and damage.
- I. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
- J. Contractor shall test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- K. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect/Design Consultant.
- L. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- M. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- N. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Design Consultant.
- O. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.

- P. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- Q. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
- R. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
- S. The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.

3.4 SYSTEM REQUIREMENTS

- A. Quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a complete and functioning system. Where quantities are not noted, they may be obtained from the drawings. In the event of a discrepancy between the specifications and the drawings, the greater quantity shall be furnished.
- B. Inter-Building Cable Plant
 - 1. Fiber Optic Cable
 - a. 6 Strand 50 μ m Indoor/Outdoor Multi Mode
 - 1) Contractor shall furnish and install plenum rated indoor/outdoor fiber optic cables in contractor-furnished and installed innerduct.
 - a) Each fiber optic cable shall be provided with a dedicated innerduct.
 - 2) The Contractor shall install a 10-foot service loop using a U-Shape configuration at the ends of each cable to be coiled, mounted, and stored on the wall above the ladder rack.
 - 3) Cables shall be routed utilizing the pathways as indicated in the technology drawings.
 - 4) The contractor shall furnish and install:
 - a) Fiber optic cable from MDF A118 to Marquee Sign as indicated on the technology drawings.
 - b) Contractor shall terminate fiber optic strands with required connectors and place them into fiber optic enclosures.
 - c) Contractor shall coordinate with FBISD for the placement of fiber media converter. Install fiber optic patch cord from fiber optic enclosure to media converter.
 - 2. Fiber Optic Termination
 - a. Contractor shall terminate fiber optic strands with fan-out kits when required and connectors and place into fiber optic enclosures as indicated in the technology drawings.
 - b. Contractor shall furnish fiber optic enclosures and coupler panels for all fiber optic strands and blank panels for all unused slots.
 - c. The Contractor shall furnish and install:
 - 1) Fiber enclosure(s) inside MDF /IDFs as indicated on the technology drawings.
- C. Intra-Building Cable Plant
 - 1. Fiber Optic Cable
 - a. 12 Strand 50 μ m Indoor/Outdoor Multi Mode
 - 1) Contractor shall furnish and install plenum rated indoor/outdoor rated fiber optic cables in contractor-furnished and installed plenum rated innerduct.
 - 2) Contractor shall install a 10-foot service loop using a U-Shape configuration mounted and stored on the wall above the ladder rack.
 - 3) Cables shall be routed utilizing the pathways as indicated in the technology drawings.
 - 4) The contractor shall furnish and install:
 - a) Plenum rated armored fiber optic cable from MDF to IDF as indicated on the technology drawings.
 - 2. Fiber Optic Termination
 - a. Contractor shall terminate all installed fiber optic strands with connectors and place into fiber optic enclosures as indicated in the technology drawings.
 - b. Contractor shall furnish fiber optic enclosures and coupler panels for all fiber optic strands and blank panels for all unused slots.
 - 3. Copper Cable
 - a. High Pair Count
 - 1) The Contractor shall furnish and install plenum-rated indoor/outdoor copper cables.
 - 2) The Contractor shall install a 10-foot service loop using a U-Shape configuration mounted at the ends of each cable, mounted, and stored on the wall above the ladder rack.
 - 3) Cables shall be routed utilizing the pathways as indicated in the technology drawings.
 - 4. High Pair Count Termination
 - a. Patch Panels
 - 1) The Contractor shall furnish and install rack mounted voice patch panels.
 - a) Two IDF's per 24 port patch panel, terminate 1 pair per port.
 - *Example: (1) 24 port patch panel: IDF#1 = ports 1-12, IDF #2 = ports 13-24

- D. Innerduct
 - 1. Inter-Building
 - a. Contractor shall furnish and install plenum rated Innerduct per manufacturer's directions.
 - 1) 2-inch, 3 cell Maxcell fabric innerduct in each 2-inch conduit as indicated on the technology drawings.
 - 2) 3-inch 3 cell detectable Maxcell fabric innerducts in each 4-inch conduit as indicated on the technology drawings.
 - 3) 3-inch, 3 cell Maxcell fabric innerduct in each 4-inch conduits as indicated on the technology drawings.
- E. Horizontal Cable
 - 1. No horizontal cable shall be longer than two hundred ninety-five (295) feet. If any station cable will be longer than two hundred ninety-five (295) feet, Contractor shall stop installation of the cable and immediately notify Architect/Design Consultant in writing. If Contractor fails to notify the Architect/Design Consultant in writing, Contractor shall replace cable at no cost to the Owner.
 - 2. The Contractor shall furnish and install horizontal cables within each Technology Region from the respective ER or TR to each outlet location as indicated in the technology drawings.
 - 3. The Contractor shall install a 10-foot service loop using a U-Shape configuration mounted and stored above the ladder rack in each respective Equipment Room or Telecommunications Room.
 - 4. The Contractor shall provide a 10-foot service loop coiled (using figure eight configuration) and supported directly above the workstation outlet.
 - 5. The Contractor shall install wet rated cat 6 cable(s) at floor boxes, and poke thru conduit(s) that are under slab or in slab.
- F. Horizontal Cable Termination
 - 1. Contractor shall terminate cables as defined by the ANSI/TIA/EIA 568-D.2 Commercial Building Wiring Standard with the EIA-568B sequence.
 - 2. Workstations
 - a. Contractor shall furnish and install modular jacks to terminate UTP horizontal cables.
 - b. Contractor shall furnish and install faceplates, systems furniture faceplates, or surface-mount boxes to house modular jacks as indicated in the technology drawings.
 - 1) Any unused faceplate positions shall have the appropriate number and color of blanks installed.
 - 3. Equipment Rooms / Telecommunications Rooms
 - a. Horizontal Cable for Data
 - 1) Contractor shall furnish and install Panduit angled patch panels, blank inserts (for all unused slots), and horizontal cable managers to terminate horizontal data cables as indicated in the technology drawings.
 - b. Horizontal Cable for IP Security
 - 1) Contractor shall furnish and install Panduit angled patch panels, blank inserts (for all unused slots), and horizontal cable managers to terminate horizontal IP security cables as indicated in the technology drawings.
 - c. Horizontal Cable for Wireless Access Points – Cat 6A
 - 1) Contractor shall furnish and install Panduit angled patch panels, blank inserts (for all unused slots), and horizontal cable managers to terminate horizontal wireless access point cables as indicated in the technology drawings.
 - d. Horizontal Cable requiring lightning protection
 - 1) Contractor shall furnish and install lightning protection on both ends of any cables on the exterior of the building as indicated in the technology drawings.
 - 2) All lightning protection shall be installed per manufacturer's instructions including but not limited to placement and bonding requirements.
 - 3) The Contractor shall furnish and install:
 - a) DITEK's Equipment for MDF/IDFs
 - b) Contractor shall terminate all osp, and indoor/outdoor cat6 / 6A cables for exterior security cameras and wireless access point to the DITEK's appropriate equipment.
 - c) Contractor shall place DITEK's Equipment and associated hardware on the wall behind rack of WAPs and security camera patch panels.
 - d) Contractor shall coordinate with FBISD IT Department for the installation of the cables from DITEK's appropriate equipment to the owner's network switch.
- G. Patch Cables (Snagless)
 - 1. Fiber
 - a. Equipment Rooms / Telecommunications Room

- 1) The Contractor shall furnish and store (1) 10-foot 10GBE LC to LC fiber optic patch cable in the original manufacturer packaging plus 25 percent spare for each terminated strand. Patch cable length is determined as needed per MDF and IDF Room layout and shall be coordinated with FBISD Technology Department.
2. Copper
- a. Workstations
 - 1) The Contractor shall furnish and store (1) Category 6 patch cable in original manufacturer packaging for each cable terminated plus 25 percent spare for each terminated cable.
 - a) Category 6 patch cables for each data/voice end user workstation outlet terminated shall be blue.
 - b) Category 6A patch cable for each wireless access outlet terminated shall be green.
 - c) Category 6A OSP patch cable for each exterior wireless access outlet terminated shall be OSP Rated
 - (1) **CONTRACTOR SHALL TEST AND INSTALL THE OSP PATCH CORD FOR THE EXTERIOR WAP. LEAVE 5-FEET OF CORD COILED AND SUPPORTED ON THE EXTERIOR OF THE BUILDING. THE CONNECTION END OF THE CORD ON THE EXTERIOR SHALL BE BAGGED AND PROTECTED FROM THE ELEMENTS. PROVIDE A RUBBER BAND OR SIMILAR FASTENER TO HOLD THE BAGGING IN PLACE UNTIL OWNER MOUNTS EXTERIOR ANTENNA.**
 - d) Category 6 patch cable for each IP camera outlet terminated shall be orange.
 - e) Category 6 OSP patch cable for each exterior IP camera outlet terminated shall be OSP Rated
 - f) Category 6 patch cable for each special system (HVAC, Kronos, and DSX) terminated shall be violet.

*Contractor shall confirm with the owner lengths, colors and quantities prior to purchase.
 - 2) The Contractor shall provide, install, and test all outdoor OSP patch cables required for Wireless Access Points (WAPs). The installation must adhere to the following requirements:
 - a) Cable Length: A minimum of 5 feet of additional slack shall be left at the exterior termination point to allow for future adjustments or re-terminations.
 - b) Cable Protection: The exterior termination of the patch cables shall be protected by sealing the connectors in a plastic bag. The bag must be securely fastened with a rubber band to ensure that the termination remains protected from the elements prior to connection to the WAPs.
 - b. Equipment Rooms / Telecommunications Rooms
 - 1) The Contractor shall furnish and store (1) Category 6/6A patch cable in original manufacturer packaging for each cable terminated plus 25 percent spare for each terminated cable.
 - a) Category 6 patch cables for each data/voice end user workstation outlet terminated shall be blue.
 - b) Category 6A patch cable for each wireless access outlet terminated shall be green.
 - c) Category 6 patch cable for each IP camera outlet terminated shall be orange.
 - d) Category 6 patch cable for each special system (HVAC, Kronos, DSX) terminated shall be violet.
 - 2) Patch cable length is determined as needed per MDF A118 / IDFs layout and shall be coordinated with Fort Bend ISD Technology Department.

*Contractor shall confirm with the owner lengths, colors and quantities prior to purchase.

H. Cable Support

1. All cables shall be installed and supported in conduit systems, cable trays, cores, sleeves, etc. as indicated in the technology drawings.
2. Contractor to shall use associated transitions, hardware to provide solid support and grounding (sized appropriately according to manufacture specifications) to be used outside the MDF/IDF and a minimum of 20' in any direction cabling trunks leave MDF /IDF. The 20' requirement is for cable tray not j-hooks.
3. Wire basket tray shall have a 6" clearance from ceiling tile to the bottom of basket tray and 12" clearance from the top of the basket tray to HVAC Units, HVAC duct, heating ducts, and heating equipment, etc.
4. Wire basket tray shall have a 12" clearance from the side of the basket tray to HVAC Units, HVAC duct, heating ducts, and heating equipment, etc.
5. Wire basket tray shall be properly grounded and bonded as per industry standards.
6. When cables leave the main pathway systems as indicated on the technology drawings, they shall be installed and supported in Contractor furnished and installed j-hooks cable supports.
7. No cable pathway shall exceed 40% fill ratio.
8. The contractor shall furnish a separate j-hook cable support pathway for each cable type (backbone fiber, backbone, copper, data, wireless access point, and security). Provide 30% growth for each system without exceeding the 40% fill rate.
9. J-hooks cable supports shall be installed no more than five-feet (5') apart on center, using only manufacturer-approved installation methods and hardware.
10. J-hooks cable supports shall be installed no higher than 3-feet above the accessible ceiling to allow for ease of access for future moves, adds and changes

11. No grid wire shall be utilized for support only use solid supports (clips, all thread, anchors, etc.).
 12. J-hooks shall be furnished with closure clips.
 13. Maximum sag between supports shall not exceed twelve-inches (12").
 14. Contractor shall establish j-hook cable supports pathways and shall coordinate pathways with all other disciplines. Under no-circumstances shall these pathways be used to support other low-voltage applications not included in this specification.
 15. Cable Dressing
 - a. No nylon cable ties shall be used at any time during the installation of the cable.
 - b. Above Ceiling
 - 1) Contractor shall furnish and install plenum-rated hook & loop straps in plenum-rated airspaces.
 - a) The Contractor shall install no more than (1) hook & loop strap between each j-hook or saddle strap or at service loop locations.
 - c. Equipment Rooms / Telecommunications Rooms
 - 1) The Contractor shall bundle all visible cables with Contractor furnished and installed hook & loop straps.
 - a) Hook & loop straps shall be installed twenty-four (24) inches apart on center.
- I. Equipment Rooms / Telecommunications Room Build-Out
 1. Plywood
 - a. The Contractor shall furnish and install 8' H x 4' W x 3/4" D sheets of BC grade fire-rated plywood as indicated in the technology drawings.
 - b. The Contractor shall mount all plywood vertically starting at 24" AFF.
 - c. The Contractor shall cover the plywood with two (2) coats of Contractor furnished white fire-retardant paint leaving exposed (1) fire rating stamp per sheet.
 2. Cable Runway (Ladder Type)
 - a. Contractor shall furnish and install cable runway using manufacturer-approved hardware and installation methods as indicated in the technology drawings.
 - b. Contractor shall furnish and install vertical sections of cable runway using manufacturer-approved hardware and installation methods to provide transition and support where cables enter or exit the room using a vertical pathway.
 - c. Contractor shall furnish and install radius drops cross member and stringers above each rack using manufacturer-approved hardware and installation methods where cables exit the horizontal section of the ladder rack.
 - d. Contractor shall ground and bond each cable runway section to the next utilizing ground straps and ensure metal-to-metal contact.
 3. Equipment Racks and Cabinets
 - a. Contractor shall furnish and install equipment racks with vertical management using manufacturer approved hardware and installation methods as indicated in the technology drawings.
 - b. Contractor shall secure relay racks to the concrete floor utilizing expandable concrete anchors.
 - c. Contractor shall secure the equipment racks to the cable runway using cable runway elevation kits and manufacturer approved hardware and installation methods.
 - d. Contractor shall bolt all equipment racks and vertical cable managers together.
 - e. Contractor shall individually ground and bond each equipment rack and ensure metal-to-metal contact.
 - J. Grounding and Bonding
 1. General
 - a. The Contractor shall ensure metal-to-metal contact for all terminations.
 - b. All materials shall be UL Listed.
 - c. All connections shall be made with UL Listed compression 2-hole lugs.
 - d. Contractor shall use an anti-oxidation compound on all connections.
 - e. In a metal frame (structural steel) building, where the steel framework is readily accessible within or external to the room; each TMGB/PBB and TGB/SBB shall be bonded to the vertical steel metal frame using a minimum # 6 AWG plenum rated green insulated conductor.
 - f. A Grounding Equalizer conductor shall be installed when required by ANSI/TIA/EIA-607-D (Interconnects multiple TBBs on the top floor and every 3rd floor in between).
 - g. The connection to building steel does not eliminate the requirement for the TBB or EBC to the service ground.
 - h. Grounding/Bonding conductors shall be labeled within (6) inches from their termination point with wrap around labels.
 2. Telecommunications Main Grounding Busbar / Primary Bonding Busbar (TMGB/PBB)
 - a. Contractor shall furnish and install a TMGB/PBB in the Equipment Room/Main Telecommunication Room as indicated in the technology drawings.

- b. TMGB/PBB shall be insulated from its support using an insulator that is listed for the purpose by a nationally recognized testing laboratory (NRTL).
 - c. Only one lug shall occupy a hole. No stacking lugs or "Double Lugging" shall be accepted.
 - 3. Telecommunications Grounding Busbar / Secondary Bonding Busbar (TGB/SBB)
 - a. Contractor shall furnish and install a TGB/SBB in each Telecommunications Room as indicated in the technology drawings.
 - b. TGB/SBB shall be insulated from its support using an insulator that is listed for the purpose by a nationally recognized testing laboratory (NRTL).
 - c. Only one lug shall occupy a hole. No stacking lugs or "Double Lugging" shall be accepted.
 - 4. Telecommunications Bonding Backbone (TBB)
 - a. The Contractor shall furnish and install a TBB consisting of a minimum #6 AWG plenum rated green insulated copper conductor in a star topology between the TMGB/PBB and each TGB/SBB as indicated in the Technology drawings.
 - b. When exceeding (13), feet the TBB shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil.
 - c. Where the TRs are stacked the TBB shall be continuous to the uppermost TR. "T" taps shall be used to tie TGB/SBBs on floors between the TMGB/PBB and the uppermost TGB/SBB.
 - d. Conductor shall be sized from the TMGB/PBB to the uppermost TGB/SBB and each conductor between a "T" tap and the TGB/SBB shall be the same size as the TBB it is fed from.
 - 5. Equipment Bonding Conductor (EBC)
 - a. Contractor shall furnish and install a minimum #6 AWG plenum rated green insulated conductor from the TMGB/PBB or TGB/SBB as applicable to each ladder rack system, equipment rack, cabinet, metallic raceway, lightning protector, or multi-pair cable with a metallic element. Contractor shall use an anti-oxidation compound on all connections.
 - b. When exceeding (13) feet the EBC shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil.
 - 6. Bonding Conductor for Telecommunications (BCT)
 - a. Contractor shall furnish and install a minimum #6 AWG plenum rated green insulated copper conductor from the TMGB/PBB to the main building electrical service ground as indicated in the Technology drawings.
 - b. The installation of the BCT to the main building electrical ground shall be performed by a licensed Electrical Contractor.
 - c. When exceeding (13) feet the BCT shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil
- K. System Labeling
 - 1. Contractor shall verify room numbers and confirm the final room numbering scheme prior to generating any labels.
 - 2. Horizontal Cables shall be labeled within (1) inches from the termination point inside the Equipment Room/Telecommunications Rooms.
 - 3. Horizontal Cables shall be labeled within (6) inches from the termination point at the workstation end.
 - 4. Backbone Fiber and Copper Cables shall be labeled within (12) inches of the visible end of the jacket and at each pull point location. If passing through an IDF it will be labeled when entering and leaving that IDF.
 - 5. Fiber Innerduct shall be labeled within (12) inches of the point of entry of the fiber optic enclosure and at each pull point location. If passing through an IDF it will be labeled when entering and leaving that IDF.
 - 6. Bonding conductors shall be labeled within (6) inches from their termination point.
 - 7. Cables shall be labeled identically at both ends.
 - 8. Equipment Racks
 - a. Equipment racks in each Equipment/Telecommunication Room shall be labeled in sequential numeric order.
 - 1) Labels shall be centered on the top front of the equipment rack.
 - 9. Cabinets
 - a. Cabinets in each Equipment/Telecommunication Room shall be labeled in sequential numeric order.
 - 1) Labels shall be centered on the top front of the Cabinet.
 - 10. Fiber Optic Enclosures
 - a. Fiber optic enclosures shall be labeled alpha-numeric starting with the 1st fiber optic enclosure in the top of the 1st equipment rack.
 - b. A label for each terminated strand shall be securely placed inside each fiber optic enclosure.
 - 11. Backbone Cable
 - a. Fiber Optic Cable
 - 1) Fiber optic backbone cable labels shall contain the cable origin room number, the cable destination room number, rack number, fiber strand numbers, and type (i.e., A118T-R1-B123/001-012MM).

- 2) Fiber optic couplers panels in fiber enclosures shall be labeled at each end by strand denoting building code, Equipment Room and/or Telecommunications Room, enclosure number, and strand number to and from respectively (i.e., A118/01/01-12 – B123/01/01-12).
- b. High Pair Count Copper Cable
 - 1) For high pair count copper backbone cables, the label scheme shall contain, cable origin room number, rack number, the cable destination room number, and cable pairs (i.e., A118-R1-B123/001-025).
12. Horizontal Cable
 - a. Inside Equipment Rooms
 - 1) Horizontal cables shall be labeled at each end with the MDF/IDF room number, rack number, patch panel number, and port number. (i.e., A118-R1-A01).
 - 2) Patch panels in each closet shall be labeled sequentially starting with the first Patch Panel in the top of the first relay rack (A, B, C, D, E, etc.).
 - 3) All patch panels will indicate the room number along with the patch panel port designation. The labels shall be mechanical labels that are neatly printed with uniform font and evenly spaced across the patch panel. Room numbers will be in sequential order throughout the panels as indicated on the drawings.
 - 4) 110-type blocks shall contain the destination room number, pair numbers, and binder pair number under each pair termination. (example)
 - a) 110-type block labels shall be printed on product-specific label strips and placed into label holders.
13. Workstation Faceplates
 - a. Cables and wall plates shall be labeled denoting origin, Equipment Room/Telecommunications Room Number, Rack Number, Patch Panel, and Port Number. (i.e., B127-R1-A01).
14. TMGB/PBB and TGB/SBB
 - a. TMGB/PBB and TGB/SBB shall be labeled with a unique identifier (i.e., TMGB/PBB-A118, TGB/SBB-B123).
15. Bonding Conductors
 - a. The following conductors shall be labeled at each end with the destination end and origin room number (i.e., A118 – IDFB123).
 - 1) Bonding Conductor for Telecommunications
 - 2) Telecommunications Bonding Backbone
 - 3) Grounding Equalizer
 - 4) Equipment Rack

3.5 TESTING REQUIREMENTS

A. Fiber Optic Cable

1. Installed strands shall be tested and certified in accordance with industry standards.
2. Only Manufacturer Certified Technicians shall perform testing.
3. The Contractor shall test bi-directionally end to end and certified in accordance with applicable industry standards and manufacturer certifications requirements with an OTDR field and Power Meter tester that is within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
4. The Contractor shall provide calibration results from the manufacturer showing the current calibration of the testers.
5. The Contractor shall notify the Architect/Design Consultant a minimum of five (5) days in advance to observe cable testing.
6. The Architect/Design Consultant may randomly select 5% of the installed strands for test verification purposes. The Contractor shall re-test these strands in the presence of the Architect/Design Consultant and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed strands at no cost to the Owner.

B. Copper Backbone Cable

1. Installed pairs shall be tested and certified in accordance with industry standards.
2. Only Manufacturer Certified Technicians shall perform testing.
3. The Contractor shall test and certify all copper pairs with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
4. The Contractor shall provide calibration results from the manufacturer showing the current calibration of the testers.
5. The Contractor shall notify the Architect/Design Consultant a minimum of five (5) days in advance to observe cable testing.
6. The Architect/Design Consultant may randomly select 5% of the installed pairs for test verification purposes. The Contractor shall re-test these pairs in the presence of the Architect/Design Consultant and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in

results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed pairs at no cost to the Owner.

C. Category 6/6A UTP Cable

1. Cable links shall be tested in accordance with industry standards.
2. Only Manufacturer Certified Technicians shall perform testing.
3. The Contractor shall test and certify the structured cable system with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.
4. No, Fail or *Pass results will be accepted.
5. The Contractor shall notify the Architect/Design Consultant a minimum of five (5) days in advance to observe field testing.
6. The Architect/Design Consultant may randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Design Consultant and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed links at no cost to the Owner.

D. Grounding and Bonding

1. Main Building Ground
 - a. Coordinate with electrical contractor and provide a copy of their test results for the main building ground. The results shall be below 25 Ohms.
2. Two-Point Ground/Continuity Testing
 - a. Prior to the two-point ground testing, a visual inspection shall be performed to verify that the bonding and grounding system is installed according to the drawings and specifications and in compliance with the TIA-607-D Standard.
 - b. All testing shall be conducted prior to any active equipment is installed.
 - c. The Contractor shall use an earth ground resistance tester that is configured for a continuity test. This is also known as a two-point tester or a "dead earth" test.
 - d. Prior to the two-point continuity test conduct a voltage test to ensure there is no stray voltage in the system.
 - e. The testing shall include but is not limited to the following points.
 - 1) Building electrical grounding electrode and the TMGB/PBB.
 - 2) TMGB/PBB, TGB/SBB to electrical ground in ER/TR.
 - 3) TMGB/PBB, TGB/SBB to the building steel (if present).
 - 4) TMGB/PBB to each TGB/SBB.
 - 5) Building steel (if present) to the electrical ground.
 - 6) TMGB/PBB, TGB/SBB to Equipment Racks
 - f. Per the TIA-607-D, the maximum value for resistance between any point in the telecommunications bonding and grounding system and the building's electrical grounding electrode system is 100 milliohms. In the case of long TBB and Grounding Equalizer conductor runs, the resistance of the conductor must be factored into the total resistance. For example, 1 km of a No. 3/0 conductor has a resistance of 0.2028 ohms. (0.06180 ohms per 1000 ft.)
 - g. The Contractor shall notify the Architect/Design Consultant a minimum of five (5) days in advance to observe field testing.

3.6 PROJECT CLOSEOUT DOCUMENTATION

A. As-Built Drawings

1. Drawings shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect/Design Consultant.
2. Three (3) sets of drawings depicting the condition of the structured cabling system as installed.
3. As-Built drawings shall be produced in AutoCAD 2013 or higher and provided in hardcopy and electronically in .dwg and PDF format. Provide (1) laminated copy ARCH E1 (30" X 42") in each telecommunications room
4. Hardcopy drawings shall be provided in the original size as issued by the Architect/Design Consultant.
 - a. PDF needs to be an original, provided to the district not a photocopy converted.
5. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect/Design Consultant.
6. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of all equipment room/telecommunication room layouts, wall elevations, equipment rack elevations, ladder racks, cable tray, sleeves, backbone, and horizontal cable pathways, workstation locations, and labeling scheme.
7. Drawings need to have the final room numbers not construction room numbers.
8. Drawings should have the network drop name at the user locations in the As-builds.

- B. Test Documentation
 - 1. Test documentation shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until these test results are received and approved by the Architect/Design Consultant.
 - 2. Three (3) sets of test documentation for the structured cabling system as installed.
 - 3. Test results shall be provided in hard copy and electronic format (i.e., manufacturer's proprietary testing software along with applicable reader software) and PDF electronic format.
 - 4. Test documentation shall be bound, sectioned, and tabbed in the following sequence as applicable:
 - a. Tester(s) Calibration Certificate(s)
 - b. Inter-Building Backbone Fiber Optic Cable
 - c. Intra-Building Backbone Fiber Optic Cable
 - d. Intra-Building Backbone Count Copper
 - e. Horizontal Category 5e Cable
 - f. Horizontal Category 6 Cable
 - g. Horizontal Category 6A Cable
 - h. Main Building Ground
 - i. Two-Point Ground/Continuity Test
- C. Manufacturer's Performance Certification
 - 1. Certificate shall be provided to the Architect/Design Consultant at the time of final system acceptance. Final payment will not be recommended until the certificate of certification is received and approved by the Architect/Design Consultant.
 - a. The manufacturer of the solution shall furnish a performance certification as per the specifications starting at final system acceptance.
 - b. One original and two copies of the Manufacturer's Certificate shall be provided.
- D. Manufacturer's Product Warranty
 - 1. Certificate of product warranty shall be provided to the Architect/Design Consultant at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Architect/Design Consultant.
 - a. The manufacturer of the solution shall furnish a product warranty as per the specifications starting at final system acceptance.
 - b. One original and two copies of the Manufacturer's product warranty shall be provided.
- E. Contactor's Statement of Warranty
 - 1. Statement of warranty shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect/Design Consultant.
 - a. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor, and workmanship starting at final system acceptance.
 - b. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number, and email address) and start and end date for warranty call outs.

END OF SECTION 271000

SECTION 27 41 00 – INTEGRATED AUDIOVISUAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED WORK

- A. 26 05 00 – Grounding and Bonding
- B. 26 05 29 – Electrical Hangers and Supports
- C. 27 10 00 – Structured Cabling System
- D. 27 51 11 – Distributed Audio System (PA)

1.02 GENERAL

- A. This section identifies the requirements, technical design, and specifications for the audiovisual systems at Fort Bend ISD Triplex Renovation located in Sugar Land, TX (“Owner”). The audiovisual systems as specified are industry standard and may include (but not be limited to) the following: flat panel display(s), flat panel display mounting hardware, projector and projector screen, audio visual switching and distribution equipment, audio systems, microphone systems, speaker systems, and audiovisual hardware as specified.
- B. Contractor shall include materials, equipment, and labor necessary to provide a complete and functional audiovisual system regardless of any items not listed or described in this specification or the associated drawings.
- C. Contractor shall verify presence and proper operation of all OFE prior to beginning work.
- D. It is strongly recommended that each prospective Contractor perform a site visit to determine any site conditions that may impact the installed system cost prior to submitting a bid and/or submittals. Failure to perform a site visit does not release the Contractor from responsibility for any existing conditions.
- E. This project requires advance configuration and programming of Control Systems and Integrated Video Conferencing System. Contractor will be required to have a background in the programming of these and all manufacturer required certifications.

1.03 QUALITY ASSURANCE

- A. The contractor providing and installing the integrated audiovisual systems and associated infrastructure shall be an authorized dealer of the specified projector manufacturer and be capable of providing the manufacturer’s maximum available product warranty.
- B. All individuals installing the audiovisual system must be employees of the authorized dealer and at least 75% of the installing staff shall have undergone a training class given by the manufacturer. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the contractor’s product submittals.

- C. The proposing contractor and the installing contractor must be the same company for the entire scope of work for audiovisual. No subcontractor to the proposing audiovisual contractor will be allowed for any portion of the audiovisual scope of work.
- D. The Audiovisual System Installer shall meet all applicable regulations of the State of Texas and Department of Labor insofar as they apply to this type of system. The bidder shall be a firm normally employed in the audiovisual industry and shall provide a reference list of (5) projects of equivalent size or larger. Contractor shall provide the following information for each project: project name, project location, project completion date (Month/Year), brief description of project, major components, and client point of contact name/information. Reference projects must be from proposed office location for the project.
- E. The bidder shall have an authorized office within (75) miles of the project's location technicians and service capabilities. The owner reserves the right to perform an on-site inspection.
- F. The bidder shall have technicians available for service with minimum of (1) day response time for service.
- G. The bidder must produce a letter from the manufacturer guaranteeing the delivery of all the equipment outlined in the specification herein.
- H. Installing contractor shall have a Infocomm / Avixa CTS-D certification overseeing the submittal and record drawings of the audiovisual systems.
- I. Installing contractor shall have a Infocomm / Avixa CTS-I certification overseeing the installation of the audiovisual systems.

1.04 REGULATORY REQUIREMENTS

- A. Standards: All work shall be performed in accordance with the latest revisions of the following standards and codes:
 - 1. Latest Local Codes and Amendments
 - 2. Latest applicable National Electrical Code (As designated by the project).
- B. Additional References:
 - 1. TIA/EIA-568-A Commercial Building Telecommunications Wiring Standard
 - 2. EIA/TIA-569 Commercial Building Standard for Telecommunication Pathways and Spaces.
 - 3. TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - 4. TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - 5. EIA/TIA 455-A Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and Other Fiber Optic Components.
 - 6. TIA/EIA TSB 67 Transmission Performance Specification for Field Testing of Unshielded Twisted-Pair Cabling Systems.
 - 7. TIA/EIA TSB 72 Centralized Optical Fiber Cabling Guidelines
 - 8. ISO/IEC 1180 Generic Cabling Standard
 - 9. EN 50173 Generic Cabling Standards for Customer Premises
 - 10. ANSI/EIA/TIA 526-14 Optical Power Loss Measurements of Installed Multimode Fiber Cable Plan.
- C. Governing Codes and Conflicts
 - 1. If the requirements of these specifications or the Project Drawings exceed those of the governing codes and regulations, then the requirements of these specifications and the Drawings shall govern. However, nothing in the Drawings or Specifications shall be construed to permit work not conforming to all governing codes and regulations.

1.05 SUBMITTAL REQUIREMENTS

- A. Contractor shall provide the following submittals required for the project.
 - 1. Part 1- Qualifications and Product Data
 - 2. Part 2- Submittal Drawings
 - 3. Part 3- Audiovisual Control System Submittal

- B. Contractor shall provide the following documentation as part of the submittal package. Partial submittals will not be accepted unless project needs on an expedited request for an individual product (Example, lead time issues, back boxes, etc.).

- C. Part 1- Qualifications and Product Data may be submitted prior to Part 2 and Part 3 completion.

- D. Qualifications and Product Data
 - 1. Provide all documentation confirming requirements noted in section 1.03 QUALITY ASSURANCE.
 - 2. Manufacturer Product Certifications (Project Specific) for Company, Installers and Programmers including Subcontractors. (Crestron, Extron, Biamp, etc.)
 - 3. Line by line conformance review of the specifications. Any variance from the specification will be annotated and an explanation given.
 - 4. Itemized list of all equipment and materials. Any substitution or approved equal products must be clearly noted in submittal.
 - 5. Itemized list of all equipment and materials including any substitutions that were approved and any proposal discrepancies. This list shall contain quantity, manufacturer, part number and description to provide a complete and functional audiovisual system.
 - 6. Manufacturer product specification sheets for all audiovisual products and cabling.
 - 7. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted.
 - 8. Submit specification sheets only. Do not submit a user or operator's manual in lieu of a specification sheet. If a specification sheet is not available from the manufacturer, submit a catalog page or the specification appendix (only) from the operation manual. PDF of the specification section of the product from the manufacturer's website is acceptable.
 - 9. Provide a Warranty Statement that contains specific details on the contractors' Warranty being proposed for this scope of work.
 - 10. Contractor shall not order, purchase, or install any equipment until Product Data submittal has been accepted in writing by the Owner/Consultant.

- E. Submittal Drawings
 - 1. Submittal drawings shall include system line diagrams, floor plans (include projector installed distance from screen with dimensioned distance), rack elevations, and/or detail drawings as required. Shop drawings shall be submitted electronically in pdf format for a 30"x42" paper size. Shop drawings shall not contain copies of or snippets of or depictions of Combs Consulting Group's drawings.
 - 2. Submittal drawing shall provide floor plans with audiovisual devices located and identified.
 - 3. Submittal drawings shall provide major cabling pathways and termination locations noted on drawings.
 - 4. Submittal drawings shall provide point-to-point wiring diagrams for devices and control as indicated on COMBS Signal Flow drawing for all components.
 - 5. Submittal drawings shall include cabling and device labeling scheme.
 - 6. Shop drawings shall be provided clearly depicting any proposed modification to the project drawings. Any modifications shall be highlighted on the shop drawings.
 - 7. Submittal drawings shall be updated as project change requests and field condition changes are completed. Current submittal drawings shall be utilized for Record Drawing or As-Built drawings.

8. Contractor shall maintain a set of submittal / shop drawings on site at all times and shall update the shop drawings on a weekly basis. Consultant drawings and specifications shall be made available during the installation of the project for reference. Both sets of drawings are the responsibility of the Contractor to provide and maintain. Drawings shall be made available for inspection at the request of the Owner / Consultant.
- F. Audiovisual Control System Submittal
1. Provide the control system submittal prior to initiating any substantial programming work and/or production of custom produced keys/labeling. Do not proceed with custom work until the proposed work product is approved in writing.
 2. Proposed touch panel/keypad control layouts for each room/panel.
 3. Initial touch panel/keypad control layouts will be required for each room/panel as part of the submission.
 4. Contractor will design and modify control interface(s) based on Owner feedback. Contractor shall participate in an initial control system kick-off meeting along with progress meetings to review control system layout and design with the owner to ensure the control system fully meets the Owner's needs and expectations.
 5. Contractor shall fully brief Owner on available programming options. Record Owner's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology and final results.
 6. Contractor will also be expected to make reasonable adjustments to completed control systems based on Owner feedback once system is in use.
 7. Once initial system programming is implemented; allow owner a (2) month period to utilize the system and make comments. Revisions to the programming shall be at no cost to the owner.
 8. After initial evaluation period coordinate with Owner, record Owner's feedback and provide adjustments as requested.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.
- B. Owner/Consultant will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- C. Proposed equivalent items must be approved in writing by the Owner/Consultant prior to submitting a bid. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.
- D. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.
- E. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.
- F. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices and intended application.
- G. All wiring, equipment and installation materials shall be new and of the highest quality.
- H. Labels on all wiring, materials and equipment must indicate a nationally recognized testing laboratory.

- I. All new equipment shall be received, stored, and staged at the Contractor's facility until delivered and installed. Contractor shall store all materials and equipment in accordance with manufacturers' instructions in a weather-tight, secure enclosure. All equipment shall be protected from dust, debris and environmental contamination. Contractor shall be responsible for safety and security of all Contractor furnished equipment and OFE until project close-out.

2.02 AUDIOVISUAL DISTRIBUTION AND CONTROL

- A. Provide turn-key AV distribution and control for each room indicated on drawings.
- B. Signal Flow Diagrams on the Drawings include expected main components. Provide additional components, accessories, and associated programming as needed to provide a fully functional Audiovisual System for each Room Type that operates as intended for all specified components.
- C. Provide, Install, and Program all PoE networking switch gear required for all audiovisual equipment. All audiovisual devices requiring PoE network cabling shall be patched to the contractor provided network switch as required.
- D. Network switch and programming for audiovisual switch shall be required to meet the manufacturer's recommendations and requirements for the IP based communications system for manufacturer such as Crestron /QSC controls system and QSC audio system.
- E. Provide a complete and tested integrated audiovisual system.
- F. Functionally complete audiovisual system shall be provided in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result shall be provided whether specifically called for, at no additional cost to Owner.

2.03 CONFERENCE ROOM – CONFERENCE 208C, 211, 308, 309, 314, 333,337,354, 362

- A. System Description
 1. Interactive Flat Panel Display by owner on height adjustable display mount by contractor.
- B. Video Displays
 1. Interactive Flat Panel Display.
 - a. Power required; data required.
 - b. Owner provided; contractor installed.
 2. Motorized Height Adjustable Flat Panel Display Wall Mount
 - a. Mount shall feature 18" of height adjustment via a wired remote control.
 - b. Mount shall support up to 250lbs and accommodate a maximum VESA pattern of 800 x 600.
 - c. Approved manufacturer:
 - 1) MooreCo iTeach Flat Panel Wall Mount 37745 (QTY 1 per "IFP65", IFP75", and "IFP86" shown on drawings.)
 - 2) Approved equal.

2.04 DIGITAL SIGNAGE LOCATIONS – VESTIBULE 300

- A. System Description
 1. Flat panel display, in-wall AV storage box, display mount by contractor. Owner furnished, contractor installed digital signage media player.

B. Video Displays

1. Flat Panel Display
 - a. Minimum two HDMI inputs.
 - b. Confirm diagonal sizing requirements with owner.
 - c. Reference drawing for display designation and location.
 - d. Minimum resolution 3840 x 2160 (4K UHD)
 - e. Contrast Ratio 4000:1
 - f. Minimum brightness of 350 nits
 - g. Minimum of (2) HDMI and (1) RS-232 inputs
 - h. Minimum 3-year Manufacturer Warranty
 - i. All other locations shall be contractor provided; contractor installed.
 - j. Approved manufacturers:
 - 1) 'FPD55' -- Samsung QB55B
 - 2) Approved equal.
2. Audiovisual Wall Box and Display Mounts
 - a. Reference drawings for Wall Box designation and location
 - b. Display mounts from 55" to 98"
 - c. Integrated single gang box cutouts and conduit knock outs.
 - d. Terminations for electrical and data
 - e. Back box trim bezel.
 - f. Approved manufacturer:
 - 1) 'WB1' -- Chief PAC526
 - 2) Approved equal.
 - g. Installation
 - 1) All AV equipment shall be installed in AV Wall Box as noted on drawings.
 - 2) Equipment as noted on drawings.
 - 3) Electrical shall provide (1) duplex receptacle mounted in back box in single gang knock out.
 - 4) Data contractor shall provide (1) faceplate mounted in back box in single gang knock out.
 - 5) AV cabling routed through knock out, separated from data and electrical.
 - 6) Coordinate power, data, and AV faceplate locations with electrical for low profile display mount locations.
 - 7) Coordinate Div. 26 for 1.25" conduit pathways from AV Wall Box to accessible ceiling.
3. Articulating Mount
 - a. Provide articulating mount where indicated on drawings.
 - b. Coordinate mounting location of power and data with electrical.
 - c. Shall meet ADA requirement.
 - d. Provide cable management sleeve.
 - e. Approved manufacturer
 - 1) Chief TS525TU
 - 2) Approved equal.

2.05 TRAINING ROOM -- 302

A. System Description

1. Three Wall Mounted Flat Panel Displays on display mounts, and AV Wall Boxes.
2. Ceiling mounted projector and ceiling enclosure.
3. Ceiling mounted motorized projection screen.
4. Ceiling mounted speakers with wall mounted control panel.

B. Audiovisual Control System

1. Audiovisual System Processor

- a. Shall provide video source and output selection and routing.
 - b. Shall provide audio from video de-embedding.
 - c. Power required; data required.
 - d. Install in Audiovisual Equipment Rack, EQ1,' located in Storage 302B.
 - e. Approved manufacturer:
 - 1) 'ACP' -- Extron DTP CrossPoint 108 4K IPCP Q MA 70 (60-1381-93)
 - 2) Supplemental Control Processor -- Extron IPCP Pro350 IP link Pro Control Processor
2. Control Panel
- a. Reference drawings for location and designation.
 - b. Provide and install all equipment and hardware to support the control systems. Test, configure and calibrate as required.
 - c. Data required. Coordinate with Div. 27 for data location.
 - d. Back box required. 1.25" Conduit from rough in location to accessible ceiling. Coordinate with Div. 26
 - e. Provide locking tamper resistant cover.
 - f. Approved manufacturer:
 - 1) 'CP1' -- Extron -- TLP Pro 725T
 - 2) Approved equal.
- C. Audiovisual Equipment Rack
1. Provide power distribution and conditioning as required.
 2. Provide network switch.
 3. 'EQ1' shall house audiovisual control processor, 'ACP,' RF Antenna Distribution, Assistive Listening System, network switch, and additional power distribution as required.
 4. Provide rack drawer for microphone storage.
 5. Provide rack shelf as required.
 6. Provide brush plates as required.
 7. Approved manufacturer:
 - a. 'EQ1' – Middle Atlantic CWR-26-22
 - b. Rack Drawer – Middle Atlantic D3LK
 - c. Rack Shelf – Middle Atlantic 1UV
 - d. Brush Plate -- SRBRUSHWM
 - e. 'Network Switch -- Netgear 8-port GBi PoE switch model # GS308P-100NAS
- D. Audiovisual Furniture
1. Lectern
 - a. Coordinate finish with Owner and Architect.
 - b. Coordinate final placement relative to wall outlet location to minimize tripping hazards.
 - c. Provide patch cabling from Floor Box as required.
 - d. Approved manufacturer
 - 1) Lexington 32-Inch Floor Lectern, Standard Laminate – Dalite Model# 98101
 - 2) Lower Locking Door, Dalite Model# 82989.
 - 3) Upper Locking Door, Dalite Model# 82899.
 - 4) Cable Caddy – Crestron Model# TT-101-B-T.
- E. Video Distribution System
1. Provide and install all equipment and hardware required to support the Video Distribution System. Test, configure and calibrate all systems.
 2. Provide and install the following equipment per room to support the installation of the Video Distribution System
- F. Multimedia Devices
1. Video Transmitter Wall Plate – 'TX1'
 - a. Reference drawings for quantities, location and designation.
 - b. Data required.

- c. Approved manufacturer:
 - 1) 'TX1' -- Extron DTP2 T 201 D 4K/60 HDMI DTP2 Transmitter – Decorator-Style Wall Plate
 - 2) Approved equal.
 2. Video Receiver – 'RX1'
 - a. Reference drawings for quantities, location and designation.
 - b. Installs in Ceiling Enclosure 'CE' or AV Wall Box 'WB1' as applicable.
 - c. Approved manufacturer:
 - 1) 'RX1' – Extron DTP R HWP 4K 231 D DTP Receiver for HDMI - Decorator-Style Wallplate
 - 2) Extron DTP HDMI 4K 230 Rx DTP Receiver for HDMI
 - 3) Approved equal.
 3. Presentation Media Switcher – 'ACP'
 - a. Power required; data required.
 - b. Audiovisual Control Processor, 'ACP,' shall provide video source and output switching and routing.
 - c. 'ACP' to output to video endpoint receivers. 'RX1,' located in AV Wall Boxes, 'WB1,' and Ceiling Enclosure 'CE.'
 - d. Installs in AV Equipment Rack, 'EQ1,' located in Storage 302B.
 - e. Reference Audiovisual Control System for manufacture information.
- G. Video Displays and Mounting
1. Flat Panel Display
 - a. Minimum two HDMI inputs.
 - b. Confirm diagonal sizing requirements with owner.
 - c. Reference drawing for display designation and location.
 - 1) FPD75- 75" Display
 - d. Minimum resolution 3840 x 2160 (4K UHD)
 - e. Contrast Ratio 4000:1
 - f. Minimum brightness of 350 nits
 - g. Minimum of (2) HDMI and (1) RS-232 inputs
 - h. Minimum 3-year Manufacturer Warranty
 - i. All other locations shall be contractor provided; contractor installed.
 - j. Approved manufacturers:
 - 1) 'FPD75' -- Samsung QB75B
 - 2) Approved equal.
 2. Audiovisual Wall Box and Display Mounts
 - a. Reference drawings for Wall Box designation and location
 - b. Display mounts from 55" to 98"
 - c. Integrated single gang box cutouts and conduit knock outs.
 - d. Terminations for electrical and data
 - e. Back box trim bezel.
 - f. Approved manufacturer:
 - 1) 'WB1' -- Chief PAC526
 - 2) Approved equal.
 - g. Installation
 - 1) All AV equipment shall be installed in AV Wall Box as noted on drawings.
 - 2) Equipment as noted on drawings.
 - 3) Electrical shall provide (1) duplex receptacle mounted in back box in single gang knock out.
 - 4) Data contractor shall provide (1) faceplate mounted in back box in single gang knock out.
 - 5) AV cabling routed through knock out, separated from data and electrical.
 - 6) Coordinate power, data, and AV faceplate locations with electrical for low profile display mount locations.

- 7) Coordinate Div. 26 for 1.25" conduit pathways from AV Wall Box to accessible ceiling.
3. Articulating Mount
 - a. Provide articulating mount where indicated on drawings.
 - b. Coordinate mounting location of power and data with electrical.
 - c. Shall meet ADA requirement.
 - d. Provide cable management sleeve.
 - e. Approved manufacturer
 - 1) Chief TS525TU
 - 2) Approved equal.
- H. Projection Systems.
 1. Provide and install video projectors, mounts, projection screens, wall enclosures and mounting hardware.
 2. Verify projector lens calculations and throw distances prior to installation.
 3. Provide and install projection screen assembly when the space is environmentally stable, clean, and free of dust.
 4. Coordinate mounting locations with both specified and architectural elements. Field verify locations before installation.
 5. Provide and install all supporting terminal equipment from source to destination. Neatly dress all cabling and provide protective sheathing as required.
 6. Video Projector
 - a. Verify lens selection to as-built/site conditions and modify selection as required.
 - b. Approved manufacturer
 - 1) 'P1' -- Epson PowerLite L630U
 - 2) Approved equal.
 7. Video Projection Screen
 - a. Projection Screen provided by Owner, installed by contractor.
 - b. Ceiling mounted.
 - c. Power required. Coordinate with Div.26 for rough-in and pathways as required.
 - d. Provide alternate of appropriate size for room orientation per District Technical Design Guidelines.
 - e. Approved manufacturers:
 - 1) 'SCR110' -- DaLite DL14958LS
 - 2) Approved equal.
 8. Projector Mount and Ceiling Enclosure
 - a. Reference drawings for location and designation.
 - b. Power required; data required.
 - c. Provide power distribution as required.
 - d. Provide drop column length as required.
 - e. Approved manufacturer:
 - 1) 'CE' -- Chief Mounts -- CMS492CP2
 - 2) Projector Mount -- Epson V12H809001
 - 3) Drop Column -- Epson ELPMB02
- I. Sound System
 1. Ceiling Speaker
 - a. Contractor shall determine final placement.
 - b. Reference drawings for location and designation.
 - c. Provide quantities required to meet room design intent and function.
 - d. Approved manufacturer:
 - 1) 'S1' -- JBL LCT81
 - 2) Approved equal.
 2. Speaker Amplifier
 - a. Power required.
 - b. 'ACP' presentation matrix shall provide 'AMP' functionality speaker output.

- c. Provide additional quantities required to meet room design intent.
 - d. PA Override required. Coordinate with PA system contractor.
 - e. Approved manufacturer:
 - 1) Stuart Audio CVA 25 x 1 70v/100v
 - 2) PA Override Ducking Amplifier -- RDL Paging Control Relay TX-PCR1
 - 3) Power Supply – RDL Model# PS-24AS.
3. Wireless Microphone System, Antenna and Distribution
- a. Ceiling mounted, true diversity RF Antenna.
 - b. Provide diversity RF antenna splitter as required. Install in Audiovisual Equipment Rack, 'EQ1.'
 - c. Provide two wireless handheld transmitters with dynamic microphone capsules. Provide two wireless bodypack transmitters with dynamic lavalier type microphones.
 - d. Provide wireless microphone receivers to meet function.
 - e. Approved manufacturer:
 - 1) 'MC2' – Shure (body pack) SLXD1/MX183
 - 2) 'MC2' – Shure (hand held) SLXD2/SM58
 - 3) Single Channel Receiver – SLXD4
 - 4) Dual Channel Receiver – 'SLXD4D
 - 5) 'AT1' – Shure UA864
 - 6) Shure UA860SWB
 - 7) Shure PA805
 - 8) RF Antenna Splitter – UA844+
4. Assistive Listening System
- a. Transmitter installs in Audiovisual Equipment Rack, 'EQ1,' located in Storage 302A.
 - b. Receive devices shall store in rack shelf, in 'EQ1.'
 - c. Provide rack drawer for receiver units and chargers.
 - d. Coordinate ALS receiver quantities and chargers with Owner.
 - e. Ceiling mounted antenna – 'AT2.'
 - f. Approved manufacturer:
 - 1) Assistive Listening System – Listen Tech L5-055-072
 - 2) 'AT2' – Listen Tech 4LT 900-072 RF Transmitter included with Assisted Listening Package.

2.06 CABLING AND CONNECTORS

- A. All indoor cabling shall be plenum rated. All outdoor cabling shall be outdoor rated and direct burial rated when in contact with grade or within conduit in contact with grade. Coordinate all cable colors with Owner/Consultant prior to ordering or installation. Provide connectors and termination as specified by manufacturer for each application.
 - 1. Provide all cabling with Black jacketing unless otherwise noted.
 - 2. Acceptable manufacturers include Extron, Crestron, Belden, West Penn Wire, Gepco and Liberty. Liberty is specified to establish a cabling baseline. Cross reference equal or greater cabling and connectors when making substitutions with the acceptable manufacturers. Submit substitution requests as described in the submittal requirements section when using a manufacturer not identified as acceptable.
- B. Pathway Wire Support
 - 1. Panduit J-Mod Cable Support System
 - 2. Erico Caddy Cat Links J-Hook Series
 - 3. Panduit Plenum Rated Hook & Loop (Black)
- C. Fire Stop
 - 1. STI Spec Seal Part Number

2. 3M Products Part Number
- D. HD-SDI | Analog Video | Genlock Cabling | CATV(RF):
1. <50':
 - a. Liberty Cable Part# 20-CMP-VID-COAX-BLK.
 - b. Terminate with Liberty Part# CM-RG59M-BNC or Liberty Part# 112975 for BNC style Connectors.
 - c. Terminate with Liberty Part# CM-RG59M-F for 'F' style connectors.
 2. 50'-200':
 - a. Liberty Cable Part# 18-CMP-VID-COAX-BLK.
 - b. Terminate with Liberty Part# CM-RG6M-BNC for BNC style connectors.
 - c. Terminate with Liberty Part# CM-RG6L-F for 'F' style connectors. HDBASET Cabling:
 3. Liberty Cable Part# 24-4P-P-L7SH-BLU.
 - a. Shielded Plenum CAT7 Cable, Blue.
 - b. Terminate with Liberty Part# 1401405012-I.
 - c. Use Conductive Copper Foil Tape 3M 3313 series 1-inch to bond the drain connection and the connector. Dress uncovered copper foil tape and cable with heat shrink.
 - d. Use Igarashi IPS PH-165 or similar type non-marring plastic jaw pliers for connector compression.
 - e. Space constricted back box or bend radius restricted installations.
 - f. Terminate with Liberty #A68IPZA-STP keystone insert and install into a keystone plenum rated surface mount box Hubbel #ISB1BKP or similar. Mount in an accessible ceiling space or accessible concealed space and run a plenum rated patch cable from the jack to the device. The plenum rated patch cable is to be same rating/quality or better than the field terminated cabling.
- E. Digital Audio Network Cabling:
1. Liberty Cable Part# 24-4P-P-L6ASH-BLK
 2. Foil Shielded CAT6a Cable, Black.
 3. Terminate with Liberty Part# 1401405012-I.
 4. Use Conductive Copper Foil Tape 3M 3313 series 1-inch to bond the drain connection and the connector. Dress uncovered copper foil tape and cable with heat shrink.
 5. Use Igarashi IPS PH-165 or similar type non-marring plastic jaw pliers for connector compression.
 6. Space constricted back box or bend radius restricted installations.
 7. Terminate with Liberty #A68IPZA-STP keystone insert and install into a keystone plenum rated surface mount box Hubbel #ISB1BKP or similar. Mount in an accessible ceiling space or accessible concealed space and run a plenum rated patch cable from the jack to the device. The plenum rated patch cable is to be same rating/quality or better than the field terminated cabling.
- F. Network | USB/KVM Extension Cabling
1. Liberty Cable Part# 24-4P-P-L6-EN-BLK.
 2. Unshielded CAT6 cable, Black.
 3. Terminate with Liberty Part# 11108080034 RJ45 Connector.
- G. HDMI | DisplayPort | DVI | USB Passive Cabling
1. Provide cable/signal transport of sufficient length to reach from source device to destination device. No digital cable shall exceed a length of 15 feet unless otherwise specified. Provide a high retention cable when available.
 2. HDMI - Liberty Cable Part# HD-600 Series.
- H. Serial Control Cabling
1. Single data pair only.
 2. Liberty Part# 22-1P-CMP-EZ-BLK.
 3. Two data pair RS232(RTS/CTS or RS485).
 4. Liberty Part# 24-2P-P485.

5. Terminate all data cabling with a reliable termination system, include hoods and retention mechanisms when available.
- I. Relay | Control Cabling:
 1. Liberty 18 Gauge, 2-Conductor Plenum-Rated Cabling – Part Number 18-2C-P-BLK.
- J. Cresnet Cabling:
 1. <500': Liberty Part# LLINX-U-P.
 2. >500': Consult with Manufacturer/Consultant prior to ordering / installation.
- K. Analog Audio | Microphone | Intercom | IFB Cabling
 1. Liberty Part# 22-1P-CMP-EZ-BLK.
 2. Terminate cabling with Neutrik XX series for XLR connectors. For ¼" TRS/TS, 1/8" and RCA connectors use Rean manufactured connectors.
- L. High Impedance Speaker Level Cabling (25v/70v):
 1. < 300':
 - a. Liberty 16 Gauge, 2-Conductor Plenum-Rated Cabling – Part Number 16-2C-P-BLK.
 2. 300' to 500'
 - a. Liberty 14 Gauge, 2-Conductor Plenum-Rated Cabling – Part Number 14-2C-P
 - b. Provide Cable with Black Jacket – Coordinate Cable Color with Architect.
 3. > 500': Consult with Manufacturer/Consultant prior to ordering / installation.
 4. Terminate when available with Neutrik "Speakon" type connectors.
- M. Low Impedance Speaker Level Cabling:
 1. < 50': Liberty 14 Gauge, 2-Conductor Plenum-Rated Cabling – Part Number 14-2C-P-BLK.
 2. 50' to 100': Liberty 12 Gauge, 2-Conductor Plenum-Rated Cabling – Part Number 12-2C-P-BLK.
 3. > 100': Consult with Manufacturer/Consultant prior to ordering / installation.
 4. Terminate when available with Neutrik 'Speakon' type connectors.
- N. Low Voltage Power Supply Cabling:
 1. Provide cabling of sufficient gauge and conductor count as required for power supply in use. Size cabling per manufacturer's device specific minimum required voltage drop.

2.07 ADDITIONAL / UNIT PRICING

- A. Provide additional unit pricing if noted on drawings and specifications including additional stock devices or alternates.
- B. Provide additional pricing for additional warranty years as required in specifications.
- C. Provide additional pricing for warranty for (X) additional years for the entire audiovisual system.

PART 3 - EXECUTION

3.01 CODES, STANDARDS, AND REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
 1. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire

2. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 3. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
 4. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
1. Telecommunications Distribution Methods Manual 13th Edition
 2. NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 3. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Electronics Industry Alliance (EIA)
- F. Federal Communications Commission (FCC)
1. FCC Part 15, Radiated Emissions Limits, revised 1998
 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 3. FCC Part 76, Cable Television Service, revised 1998
- G. Insulated Cable Engineers Association (ICEA)
1. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable
 2. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors
 3. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- H. International Electrotechnical Commission (IEC)
- I. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
1. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 2. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive
 3. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
 4. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code
 5. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
- J. International Organization for Standardization (ISO)
1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
 2. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
 4. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 5. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
- K. National Cable Television Association (NCTA)
- L. National Electrical Manufacturers Association (NEMA)
1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
- M. National Fire Protection Association (NFPA)
1. NFPA-70, National Electrical Code
 2. NFPA-101, Life Safety Code

3. NFPA-297, Guide on Principles and Practices for Telecommunications Systems
 4. NFPA-780, Standard for the Installation of Lightning Protection Systems.
- N. National Institute Standards and Technology (NIST)
- O. Occupational Safety and Health Administration (OSHA)
- P. Telecommunications Industry Association (TIA)
1. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises, 2009
 2. ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard, 2009
 3. ANSI/TIA -568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, 2009
 4. ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard, 2008
 5. ANSI/TIA/EIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces, 2005
 6. ANSI/TIA-569-B Amendment 1, Commercial Building Standard for Telecommunications Pathways and Spaces, 2009
 7. ANSI/TIA/EIA-606-B, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, 2012
 8. ANSI/TIA/EIA-607-B, Commercial Building Grounding and Bonding Requirements for Telecommunications, 2011
 9. ANSI/TIA-758, Customer-Owned Outside Plant Telecommunications Infrastructure Standard, 2004
- Q. Underwriters Laboratories, Inc. (UL)
1. UL 510 (2005; Rev thru Aug 2005) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
 2. UL 910 (NFPA 262 1990) Applicable Flame Test
- R. In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Architect/Engineer in writing of any such occurrences before purchasing or installing any equipment or materials. The Architect/Engineer will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to: design changes, equipment, materials and/or installation changes. In any event Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.

3.02 GENERAL REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), Project State, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Engineer for direction before proceeding with that part of the work.
- B. The Contractor shall be responsible for coordination with other trades to ensure any conflicts or potential conflicts are resolved prior to any work beginning on the project.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.
- D. No deviations from the plans or specifications shall be made without full consent in writing of the Architect/Engineer. The Contractor shall have written approval from the Architect/Engineer for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Engineer prior to proceeding with the work, the contractor shall not be reimbursed for the work.

- E. The Contractor shall obtain written permission from the Architect/Engineer before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.
- F. Contractor shall notify the Architect/Engineer a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Engineer to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- G. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- H. Equipment and materials installed by the Contractor shall be free of defects and damage.
- I. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
- J. Contractor shall test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- K. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect/Engineer.
- L. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- M. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- N. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Engineer.
- O. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
- P. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- Q. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
- R. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
- S. The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.
- T. Contractor shall immediately report to the Engineer any design or installation irregularities, particularly architectural elements that interfere with the intended coverage angles of loudspeakers and projector, so that appropriate action may be taken.

- U. Contractor shall observe all HDBaseT Alliance cable types, lengths, bundling, termination, and patching requirements and limitations when installing audio/video over twisted-pair cabling.
- V. Contractor shall observe signal separation and signal separation best practices at all times.
- W. Any cabling found to be damaged shall be replaced at no cost.
- X. Signals shall be separated and grouped according to type and voltage level.
- Y. Contractor shall provide all required conduit and sleeves unless otherwise specified. Contractor shall provide conduit bushings even when it is the responsibility of other trades prior to cable installation.
- Z. Contractor shall provide and utilize rear rack rails, lacing bars, and any other required cable dressing equipment/supplies to ensure proper industry-standard signal separation is achieved.

3.03 AUDIOVISUAL CONTROL SYSTEMS

- A. Contractor shall furnish, install and configure a complete audio/video switching, transport and control system as specified and indicated on the technology drawings.
- B. Contractor is responsible for all ancillary AV switching or active components necessary to provide a complete and functional AV system.
- C. Contractor is responsible for all AV specific cabling, interconnects, patch cords and other ancillary devices required to provide a complete system.
- D. Contractor shall coordinate the programming of the touch panels with the Owner/Design Team. Touch panels shall be branded to reflect the colors and logos of the Owner. This coordination may consist of multiple in-person meetings to ensure that the finished product fully meets the Owner's needs and expectations.
 - 1. Contractor shall fully brief Owner on available configuration settings / options of the program(s).
 - 2. Contractor shall record the Owner's preferences / decisions and build the initial system program(s).
 - 3. Contractor shall deliver a written record including (at minimum):
 - a. The Owner's preferences / decisions
 - b. Contractor's plan for implementation and its methodology.
 - c. The final programming / implementation results.
- E. Once the system programming has been completed and implemented, the Contractor shall allow a minimum 2-month evaluation period for the Owner to use the system and provide feedback.
- F. After the evaluation period, the Contractor shall coordinate with the Owner to gain feedback on the system operation. The Contractor shall record the Owner's feedback and provide programming adjustments to resolve any items as directed by the Owner.
- G. Contractor shall install the entire control system as specified in accordance with manufactures guidelines and industry best practices.
- H. Control processor(s) shall be connected to an un-switched power outlet. Control processor(s) shall be connected to UPS outlet(s) if available.
- I. Control system shall be programmed in a manner consistent with current industry best practices.
 - 1. Control functions shall include (but are not limited to) the following:
 - 2. System/Device Power On/Off.
 - 3. Display Source and Sink Switching.

4. Program Volume Adjustment.
 5. Audio DSP Control.
- J. All network-enabled control systems shall be provided with virtual 'soft' control panel client(s)
- K. All control system programming shall be delivered to the Owner. The Programmer shall transfer all source code/files related to the system. All programming shall be delivered in both compiled and non-compiled form. Upon system acceptance, ownership of the control programming shall be transferred to the Owner for their future use or modification. No claim shall be made by the programmer for continued licensing or other ongoing fees for continued usage of the control system program.

3.04 CABLE INSTALLATION

- A. All cables shall be installed and supported in conduit systems, cable trays, cores, sleeves, etc.
- B. When cables leave the main pathway systems, they shall be installed and supported in Contractor furnished and installed j-hooks or saddle straps.
- C. No cable pathway shall exceed NEC limited low voltage fill ratios.
- D. The contractor shall furnish a separate j-hook or saddle strap pathway for each cable type (data, voice, video and security).
1. J-hooks and saddle straps shall be installed no more than five-feet (5') apart on center, using only manufacturer-approved installation methods and hardware.
 2. J-hooks shall be furnished with closure clips.
 3. Maximum sag between supports shall not exceed twelve-inches (12").
 4. Contractor shall establish j-hook and saddle strap pathways and shall coordinate pathways with all other disciplines. Under no-circumstances shall these pathways be used to support other low-voltage applications not included in this specification.
 5. The Contractor shall install no more than (1) hook & loop strap between each j-hook or saddle strap or at service loop locations.
- E. No nylon cable ties shall be used at any time during the installation of the cable.
- F. Signal separation guidelines and best practices shall be observed for the complete length of all cable runs.
- G. Above Ceiling-Contractor shall furnish and install plenum-rated hook & loop straps in plenum-rated airspaces.
- H. Equipment Rooms / Telecommunications Rooms- The Contractor shall bundle all visible cables with Contractor furnished and installed hook & loop straps.
- I. Hook & loop straps shall be installed twenty-four (24) inches apart on center.
- J. Plywood-The Contractor shall furnish and install 8' H x 4' W x 3/4" D sheets of BC grade fire-rated plywood as when in the technology drawings.
- K. The Contractor shall mount all plywood vertically starting at 24" AFF.
- L. The Contractor shall cover the plywood with two (2) coats of Contractor furnished white fire retardant paint leaving exposed (1) fire rating stamp per sheet

3.05 DEVICE IDENTIFICATION

- A. Contractor will permanently affix labels to each cable. Labels will be affixed at a distance of 3" from the end of each cable end. If label cannot be easily viewed from this placement, cable may be placed 1" from the cable end. Cable label shall include unique cable number, source system name, source termination point, and destination system name and destination termination point. Cable labels will be identical on each cable end. Contractor to contact Consultant for additional information, if necessary.
- B. Contractor will provide equipment labeling for each device front and back according to the system name used in the shop drawings. Contractor may use laminated labels (white print on black labels in front, black print on yellow in back) or equivalent.
- C. Contractor will provide engraved plastic laminate labels for all racks. Rack labels to be 1" x 2" with white lettering (Arial font) on black matte finish, plastic.
- D. Contractor will provide all Input/Output (I/O) panels. I/O panels will be produced from black anodized aluminum and engraved with white lettering.

3.06 ACCEPTANCE REQUIREMENTS

- A. Audiovisual System Testing and Configuration
- B. Contractor shall un-pack and pre-test equipment prior to installation into the production environment. All configurations shall be re-verified prior to the units being placed into service.
- C. Contractor shall test and commission each component per the specifications and manufacturer's installation instructions.
- D. Contractor shall test and verify for full operational and network support control functionalities and connections per the specifications and manufacturer's installation instructions.
- E. All network devices shall be verified for link and auto negotiation to the highest connection rate.
- F. Audio conferencing systems shall be configured to provide excellent audio performance. Verify POTS or VoIP phone system with Owner/Owner/Consultant prior to ordering and installation. Contractor shall place test calls utilizing the audio conferencing system to the system manufacturer for system calibration and testing.
- G. Video conferencing systems shall be configured to provide excellent audio performance. Contractor shall place test calls utilizing the video conferencing system to the system manufacturer for system calibration and testing.
- H. Contractor shall test and verify all functionalities as installed per the specifications and manufacturer's installation instructions.
- I. All Crestron Digitalmedia demonstration and acceptance tests shall be performed by a Crestron Digitalmedia Certified Engineer (DMC-E).
- J. Projector(s) shall be installed square in relation to the screen, and shall be adjusted to fit and fill the screen fully. Projector(s) shall be overscanned slightly into the screen border (if applicable). Projected image shall be square and level. Projector(s) shall be installed so that digital keystone correction is not utilized.
- K. In situations where keystone correction may be required, notify Owner/Consultant and coordinate solution prior to installation.

- L. Projector(s) shall be installed in such a way that the axis of the lens is perpendicular to the plane of the projection surface.
- M. In case of mismatch between projector aspect ratio and screen aspect ratio, projector shall be configured to output at screen aspect ratio.
- N. In case of mismatch between display device and signal aspect ratio, system shall be configured such that the source image best fits and fills the display device.
- O. Unless noted otherwise, all projection screens shall be mounted with the lower edge of the viewable image area at 48" A.F.F.
- P. Provide additional black drop as required.
- Q. Video display system(s) minimum test protocols:
 - 1. Test each video display system with test signal generating equipment capable of outputting the following resolutions. (Ultra HD and 4K resolutions required only when testing 4K systems)
 - 2. 4:3 - 640x480, 800x600, 1024x768
 - 3. 16:9 - 1280x720 (720p), 1366x768, 1600x900, 1920x1080 (1080p), 3840x2160 (Ultra HD), 4096x2160 (DCI 4K).
 - 4. 16:10 - 1280x800, 1440x900, 1680x1050, 1920x1200
 - 5. Test signal generator must be capable of outputting the correct signal protocol using the applicable connectivity (RCA/BNC, S-Video, VGA, DVI, HDMI, Displayport, Etc.).
 - 6. The test signal generator must be capable of outputting a standard set of color bars, grid pattern, grayscale, checkerboard and multi-burst.

3.07 TRAINING

- A. Prior to the training session, the contractor shall provide a printed quick guide on how an end user will use the system in the training room. A laminated copy will be installed with the rack after training.
- B. Contractor shall provide a proposed training schedule to the Owner/Consultant prior to substantial completion.
- C. Contractor shall provide a proposed training syllabus for both administrative users and end-users prior to substantial completion.
- D. Training shall include all aspects of the Audio/Visual System as specified and installed.
- E. Contractor shall include provisions within the total cost proposal for a minimum of two (2) System Administrator training sessions. It is anticipated these trainings will cover advanced functions of the system, trouble-shooting techniques and other subject matter pertinent to the on-going support of the video conference system at the installed facility. System administration training sessions should be planned for approximately 5 persons. Each training session shall be planned for at least 3 hours per session.
- F. Contractor shall include provisions within the total cost proposal for a minimum of three (3) End-User training sessions. It is anticipated this training will cover basic function and operation of the system by faculty. This would include event display management, source control and general systems operation for all installed system. User training sessions should be planned for approximately 10 persons each session. Each training session shall be planned for at least 3 hours per session.

3.08 CLOSE OUT DOCUMENTATION

- A. Contractor shall provide full close out documentation for project including floor plan drawings, product data, signal flow diagrams, point-to-point wiring diagrams, programming documents and files, testing documents, training documents, and all relevant documentation to the project.
- B. All revisions from initial bid documents shall be included in the documents including ASI, PR, RFI, and Field condition revisions.
- C. Close Out documentation shall be delivered to consultant, owner, and architect no later than (30) days after substantial completion.

END OF SECTION 27 4116

SECTION 275100 - PUBLIC ADDRESS AND WIRELESS CLOCK SYSTEM

PART 1 - GENERAL

- 1.01 This section identifies the requirements, technical design, and specifications for the address and clock systems at the Fort Bend ISD Triplex, located in Sugar Land, Texas ("Owner"). The public address and clock systems as specified are Industry-Standard and include 2-way intercom and 1-way paging/public address systems, paging of individual rooms, wireless clocks, and other hardware as specified.
- 1.02 Contractor shall include materials, equipment, and labor necessary to provide complete and functional public address and clock systems regardless of any items not listed or described in this specification or the associated drawings.
- 1.03 Contractor shall be responsible for assisting and/or facilitating the registration of the FM signal for the Wireless Clock Transmitter to the Owner as required by the FCC and/or other authorities. This includes all registration fees, applications, etc. All costs for these services shall be inclusive of the total cost proposal (bid price)
- 1.04 The Contractor shall provide a Manufacturer's Performance Certification for the installed audio system.
- 1.05 The existing Telecor XL building intercom system will be expanded to accommodate the new devices.
- 1.06 REQUIREMENTS:
- A. Division 1
 - B. Contractor Experience Requirements
 - C. Submittal Requirements
 - D. Acceptable Manufacturers
 - E. Codes, Standards and Regulations
 - F. General Requirements
 - G. System Requirements
 - H. Testing Requirements
 - I. Project Closeout Documentation
- 1.07 RELATED REQUIREMENTS
- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 27 and shall be complied with in every respect. The Contractor shall examine all of the items which make up the Contract Documents and shall coordinate them with the work on the project.
 - B. Contractor Experience Requirements
 - 1. The Contractor shall possess all relevant Manufacturer Certifications (i.e., speakers, gateways, headend equipment, etc.), for both the company and individual technicians prior to submitting a bid for the work.
 - 2. The Contractor shall have been in business for a minimum of five (5) years.
 - 3. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.
 - 4. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
 - 5. Certification shall be submitted verifying the Contractor is the manufacturer's authorized Contractor.
 - 6. Certificates of attendance will be submitted for attendance in manufacturer's installation / maintenance training by the Contractor's directly employed personnel.
 - 7. Provide 24-hour support, 7 days a week within 2 hours during normal business day and 4 hours during non-business hours.
- 1.08 SUBMITTAL REQUIREMENTS
- A. Pre-Installation Submittal
 - 1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Design Consultant.
 - 2. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.
 - 3. Manufacturer product data sheets for each proposed system component.
 - a. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted.
 - 4. Manufacturer Product Certifications for Company.
 - 5. Manufacturer Product Certifications for Installers.
 - 6. Manufacturer Certifications for testing equipment technicians.
 - 7. Manufacturer Certifications for testing equipment calibration.
 - 8. Manufacturer Certifications for Contractor's Project Manager and available for all onsite coordination meetings.
 - 9. Manufacturer Warranty letter.
 - 10. Documentation indicating that Contractor has been in business for (5) years.

11. Address of Contractor's local office within a 75 mile radius of the project site.
 12. Quantity of full-time local technicians within a 75 mile radius of the project site.
 13. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least one (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
 14. List of completed and on-going projects with the owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.
 15. Shop drawings of the proposed system installation.
 - a. Shop drawings shall include speaker locations, gateway locations and mounting method, cabling diagrams, outlet locations, preliminary cable numbers, proposed cable pathways, system schematics, and riser diagrams. Shop drawings shall be submitted on 30" X 42" bond paper.
 - b. Contractor shall maintain a set of shop drawings on site at all times and shall update the shop drawings on a weekly basis. Shop drawings shall be made available for inspection at the request of the Architect/Design Consultant.
 16. Itemized list of all equipment, materials and labor required for the installation of the audio system as specified herein.
 - a. This list shall be provided in printed and electronic format (Microsoft Excel) and shall contain Part Number, Description, Unit of Measure, Unit Cost, Quantity, Labor Cost and Extended Cost to provide a complete and functional audio-visual system.
- B. Project Closeout Submittal
1. The Contractor shall provide three (3) sets of comprehensive drawings accurately depicting the "as-built" condition Public Address and Clock Systems as they were installed to the owner/Consultant at the time of substantial completion. Final payment will not be made until these as-built documents are received and approved by the owner/Consultant.
 - a. As-built drawings must be provided in original hardcopy format and on a CD-ROM and/or delivered electronically in AutoCAD rel. 2010 or higher.
 2. Documentation shall include but not be limited to:
 - a. Equipment O & M manuals
 - b. Installed equipment list (manufacturer model numbers, serial numbers, installed locations, etc.)
 - c. Configuration information in Microsoft Excel format (IP addresses, Passwords and Usernames etc.)
 - d. Warranty support information
 - e. Documentation shall be bound, sectioned and tabbed in the following order (when applicable):
 - 1) Equipment O&M Manuals (Bound Separately)
 - 2) Installed Equipment List
 - 3) Configuration Information
 - 4) Warranty Support Information
 3. The Contractor shall provide three (3) sets of test documentation for the Public Address and Clock Systems to the Architect/Design Consultant at the time of final systems acceptance. Test results shall be provided in original hardcopy format and on a CD-ROM. Final payment will not be made until these test results are received and approved by the Architect/Design Consultant.
 4. The Contractor shall furnish the original Certificate of Warranty to the Architect/Design Consultant at the time of final systems acceptance. Final payment will not be made until this Certificate of Warranty is received and approved by the Architect/Design Consultant.
 5. Contractor shall provide warranty information to include the name, address and phone number contacts for warranty call outs. Final payment will not be made until this warranty information is received and approved by the Architect/Design Consultant

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.
- B. Architect/Design Consultant will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- C. Proposed equivalent items must be approved in writing by the Architect/Design Consultant prior to submitting a bid. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.
- D. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.
- E. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.

- F. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
- G. All wiring, equipment, and installation materials shall be new and of the highest quality.
- H. Labels on all wiring, materials, and equipment must indicate a nationally recognized testing laboratory.
- I. Original Equipment Manufacturer (OEM) documentation must be provided to the Architect/Design Consultant which certifies performance characteristics and compliance with industry standards.

2.02 ACCEPTABLE MANUFACTURERS

A. Public Address System

1. The following equipment shall be used as a basis of design for the Public Address System. Equivalent systems and/or components from the manufacturers Quamland, Bowen and TeleCor are also acceptable.
 - a. Provide 2-way communications to every interior occupied space. Exterior spaces do not require 2-way communication.
2. Networked Controller:
 - a. Carehawk – Part Number CH1000
 - 1) Include all ancillary required parts for a fully functional system.
3. Switching Security Cards:
 - a. 16 Port Carehawk Part Number - SS-16
 - b. 32 Port Carehawk Part Number - SS-32
4. Paging Intercom Volume Control:
 - a. 20W Volume Control – Quam Part Number QC10
5. Paging Intercom Master Station:
 - a. Display Administrative Console - Carehawk Part Number DA1
 - 1) Contractor shall coordinate with owner/architect prior to purchase for manufacture and model #
6. Provide the following program sources installed in a remote desk intercom cabinet installed at the reception area.
 - a. AM / FM Receiver/CD with Mixer/Preamp and Monitor Loudspeaker
 - 1) Contractor shall coordinate with owner/architect prior to purchase for manufacture and model #.
 - b. CD/MP3-iPod Player
 - 1) Contractor shall coordinate with owner/architect prior to purchase for manufacture and model #.
 - c. 8-input stereo mic/line mixer
 - 1) Contractor shall coordinate with owner/architect prior to purchase for manufacture and model #.
 - d. Provide microphone with desk stand and integral-locking, press-to-talk switch at the at the Front Desk.
 - 1) Contractor shall coordinate with owner/architect prior to purchase for manufacture and model #.
7. Wall Mounted Shelf for PPS:
 - a. Middle Atlantic Furniture Side Wall Mount Shelf – Part Number WMS-1614xx
8. PPS Battery Backup for Paging System:
 - a. APC 1500VA Smart-UPS 120V – Part Number SMT1500
 - b. Or Pre-Approved Equal
9. Loudspeakers:
 - a. 25 Volt 2' X 2' Speaker with integrated back box. (Typical Classroom):
 - 1) Quam Lay-in Ceiling Speaker – Part Number System 12
 - 2) Approved Equivalent
 - b. Ceiling-Mounted Cut-In Loudspeaker (for hard lid applications)
 - 1) Quam Cut-in Ceiling Speaker – Part Number System 21
 - 2) Approved Equivalent
 - c. Surface-Mounted Paging Loudspeaker – Indoor (Locations Without Accessible Ceiling):
 - 1) Valcom Metal Wall Speaker – Part Number V-1052C
 - 2) Approved Equivalent
 - d. Exterior and GYM Surface-Mounted Paging Loudspeaker –
 - 1) Atlas Surface-Mount Paging Horn Loudspeaker (15 Watt) – Part Number APF15T
 - a) Provide Atlas Recessed Back Boxes and Vandal Resistant Baffles for All Loudspeakers
 - b) Coordinate color with Architect/Design Consultant prior to ordering.
 - c) Exterior speakers shall be provided with surge protection.
 - 2) Approved Equivalent
10. Bridges Backboxes and Cables:
 - a. Wire Guards for Wall Speakers (Typical Gymnasiums)
 - 1) Valcom Wire Cage for Wall Speakers – Part Number V-WGWALL-2
11. Paging System Cabling:
 - a. All public address system cabling shall be white in color.

- b. General Gen Speed 6
 - c. Belden Cat 6
 - d. Liberty 4-Conductor, Plenum-Rated, Shielded Cable – Part Number 22-4C-PSH
 - e. Or Equivalent
12. Pathway ire Support
- a. Panduit J-Mod Cable Support System
 - b. Erico – CADDY CAT LINKS J-Hook Series
13. Provide administrative handsets with 12 digit keypad to transmit calls to other stations and initiate commands for programming and operation at the following locations:
- a. Front Desk
 - b. Principal's Office
 - c. Assistant Principal's Office
 - d. Nurse's Office
 - e. Attendant's Office
14. Provide microphone with desk stand and integral lock, push-to-talk switch at the following locations:
- a. Front Desk
- B. Clock System
1. The following equipment shall be used as a basis of design for the clock system. Equivalent systems and/or components from the manufacturers Saplin and Bowen are also acceptable.
- a. System Controller SSIQ 5w 6 Signal Ethernet – American Time Model# SSQMSTR-05N6E
 - b. Stock Clock SSIQ 12" Round Surface Black Battery Ch 4 Battery Booster – American Time Model# SQ56BADD304BP
 - c. Clock SSIQ 15" Round Surface Black Battery Ch 4 Battery Booster – American Time Model# SQ66BADD304BP
 - d. Clock SSIQ 12" Round Ddw Black Battery Ch 4 Battery Booster – American Time Model# SQ93BADD204BP
 - e. Clock Digital SSIQ 4" Red 4 Digit Surface Black 120v 3 Prong Plug – American Time Model# SQA441RSP
 - f. Guard Wire Open Front 16 1/2" X 7 1/4" X 5 "D – American Time Model# G2091
 - g. Guard Hinged 19 1/2" X 19 1/2" X 4 3/4"D – American Time Model# 1500

PART 3 - EXECUTION

3.01 CODES, STANDARDS AND REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM B 1 2001 2007 Standard Specification for Hard Drawn Copper Wire
 - 2. ASTM B 8 2004 Standard Specification for Concentric Lay Stranded Copper Conductors, Hard, Medium Hard, or Soft
 - 3. ASTM D 1557 2007 Standard Test Methods for Laboratory Compaction Characteristics of Soil sin Modified Effort 56,000 ft lbf/ft³ 2700 kN/m³
 - 4. ASTM D 709 2001 2007 Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
 - 1. Telecommunications Distribution Methods Manual 13th Edition
 - 2. NECA/BICSI 568 2006 – Standard for Installing Commercial Building Telecommunications Cabling
 - 3. NECA/BICSI 607 2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Electronics Industry Alliance (EIA)
- F. Federal Communications Commission (FCC)
 - 1. FCC Part 15, Radiated Emissions Limits, revised 1998
 - 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 - 3. FCC Part 76, Cable Television Service, revised 1998
- G. Insulated Cable Engineers Association (ICEA)
 - 1. ICEA S 87 640 2006 Fiber Optic Outside Plant Communications Cable
 - 2. ICEA S 98 688 2006 Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors
 - 3. ICEA S 99 689 2006 Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- H. International Electrotechnical Commission (IEC)
- I. Institute of Electrical and Electronics Engineers, Inc. (IEEE)
 - 1. IEEE Standard 81 1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 - 2. IEEE Standard 1100 1999, Recommended for Practice for Power and Grounding Sensitive

3. Electronic Equipment in Industrial and Commercial Power Systems [IEEE Emerald Book]
 4. IEEE C2 [2007][Errata 2007][INT 2008][National Electrical Safety Code
 5. IEEE Std 100 [2000][The Authority][e Dictionary of IEEE Standards Terms
- J. International Organization for Standardization (ISO)
1. International Organization of Standardization International Electrotechnical Commission [ISO][IEC]
 2. ISO/IEC 11801, Information Technology Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14763-1, Information Technology Implementation and Operation of Customer Premises Cabling Administration, 1999
 4. ISO/IEC 11801, Information Technology Generic Cabling for Customer Premises, 1995
 5. ISO/IEC 14763-1, Information Technology Implementation and Operation of Customer Premises Cabling Administration, 1999
- K. National Cable Television Association (NCTA)
- L. National Electrical Manufacturers Association (NEMA)
1. NEMA C62.61 [1993][Gas Tube Surge Arresters on Wire Line Telephone Circuits
- M. National Fire Protection Association (NFPA)
1. NFPA 70, National Electrical Code
 2. NFPA 101, Life Safety Code
 3. NFPA 297, Guide on Principles and Practices for Telecommunications Systems
 4. NFPA 780, Standard for the Installation of Lightning Protection Systems.
- N. National Institute Standards and Technology (NIST)
- O. Occupational Safety and Health Administration (OSHA)
- P. Telecommunications Industry Association (TIA)
1. ANSI/TIA-568.0-D-1, Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA-568.0-D-2, Balanced Twisted Pair Telecommunications Cabling and Components Standard.
 4. ANSI/TIA-568.3-D-1, Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure.
 7. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding in Earth for Customer Premises.
 8. ANSI/TIA-758-B, Customer Owned Outside Plant Telecommunications Infrastructure Standard.
- Q. Underwriters Laboratories, Inc. (UL)
1. UL 510 [2005][e thru Au 2005][Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape
 2. UL 910 [NFPA 262 1990][Applicable Flame Test

3.02 In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Architect/Design Consultant in writing of any such occurrences before purchasing or installing any equipment or materials. The Architect/Design Consultant will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to: design changes, equipment, materials and/or installation changes. In any event Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.

3.03 The Contractor shall assist the Audio-Visual Systems contractor in connecting the PA/Intercom system to the classroom audio visual systems in each classroom. This connection will allow for page override ducking of the classroom Audio Visual System

3.04 GENERAL REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), Project State, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Design Consultant for direction before proceeding with that part of the work.
- B. The Contractor shall be responsible for coordination with other trades to ensure any conflicts or potential conflicts are resolved prior to any work beginning on the project.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.
- D. No deviations from the plans or specifications shall be made without full consent in writing of the Architect/Design Consultant. The Contractor shall have written approval from the Architect/Design Consultant for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Design Consultant prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- E. The Contractor shall obtain written permission from the Architect/Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.

- F. Contractor shall notify the Architect/Design Consultant a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Design Consultant to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- G. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- H. Equipment and materials installed by the Contractor shall be free of defects and damage.
- I. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
- J. Contractor shall test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- K. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect/Design Consultant.
- L. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- M. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- N. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Design Consultant.
- O. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
- P. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
- Q. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
- R. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
- S. The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.
- T. Contractor shall immediately report to the Design Consultant any design or installation irregularities, particularly architectural elements that interfere with the intended coverage angles of loudspeakers and projector, so that appropriate action may be taken.
- U. Contractor shall observe signal separation and signal separation best practices at all times.
- V. Any cabling found to be damaged shall be replaced at no cost.
- W. Signals shall be separated and grouped according to type and voltage level.
- X. Contractor shall provide all required conduit and sleeves unless otherwise specified. Contractor shall provide conduit bushings even when it is the responsibility of other trades prior to cable installation.

3.05 SYSTEM REQUIREMENTS

- A. Quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a complete and functioning system. Where quantities are not noted, they may be obtained from the drawings. In the event of a discrepancy between the specifications and the drawings, the greater quantity shall be furnished.
- B. Networked Controller:
 - 1. Contractor shall furnish and install the networked controller as indicated on the technology drawings and associated equipment schedules and diagrams.
 - 2. Contractor shall provide installation in accordance with Manufacturer's installation instructions.
 - 3. Contractor shall coordinate exact location placement to ensure all spaces are coordinated with other trades sharing the spaces.
 - 4. Contractor shall load the latest firmware updates on all equipment and components.
 - 5. Contractor shall energize and commission equipment in accordance with manufacturer's instructions and guidelines.
 - 6. Contractor shall work with the owner to ensure each piece is properly configured and fully operational. Upon completion, the equipment shall be clean and left in perfect operating condition.
- C. Switching Security Card(s)
 - 1. Contractor shall furnish and install the switching security card as indicated on the technology drawings and associated equipment schedules and diagrams.
 - 2. Contractor shall provide installation in accordance with Manufacturer's installation instructions.
 - 3. Contractor shall energize and commission equipment in accordance with manufacturer's instructions and guidelines.

4. Contractor shall provide final adjustments. Upon completion, the equipment shall be clean, adjusted and left in perfect operating condition.
- D. Wall-Mounted Shelf:
1. Contractor shall furnish and install the shelf as indicated on the technology drawings and associated equipment schedules and diagrams.
 2. Contractor shall provide installation in accordance with Manufacturer's installation instructions.
 3. Upon completion the contractor shall ensure the equipment is clean, level, properly anchored and left in perfect operating condition.
- E. UPS / Battery Backup for Paging System:
1. Contractor shall furnish and install the UPS as indicated on the technology drawings and associated equipment schedules and diagrams.
 2. Contractor shall provide installation in accordance with Manufacturer's installation instructions.
 3. Contractor shall load the latest firmware updates on all equipment and components.
 4. Contractor shall energize and commission equipment in accordance with manufacturer's instructions and guidelines.
 5. Contractor shall provide final adjustments. Upon completion, the equipment shall be clean, adjusted and left in perfect operating condition.
- F. Loudspeakers
1. Contractor shall furnish and install the loudspeakers as indicated on the technology drawings, and associated equipment schedules and diagrams.
 - a. Drop-Tile, Ceiling-Mounted talkback Paging Loudspeaker (Typical Classrooms):
 - b. Drop-Tile, Ceiling-Mounted Paging Loudspeaker (Typical Offices/Hallway/Etc.):
 - c. Surface-Mounted Paging Loudspeaker – Indoor (Locations Without Accessible Ceiling):
 - d. Surface-Mounted Horn Paging Loudspeaker – Outdoor:
 2. Contractor shall furnish installation in accordance with Manufacturer's installation instructions.
 3. Contractor shall energize and commission equipment in accordance with manufacturer instructions.
 4. Contractor shall work with the owner to ensure each speaker is properly configured and fully operational.
 5. Contractor shall adjust the volume levels on each speaker to the satisfaction of the owner.
 6. Upon completion, the equipment shall be clean and left in perfect operating condition
- G. Bridges / Backboxes and Cages
1. Contractor shall furnish and install bridges and backboxes in all drop tile locations as indicated on the technology drawings.
 2. Contractor shall furnish and install cages on wall speakers in areas where damage is likely (such as gymsnasiums) as indicated on the technology drawings.
 3. Contractor shall furnish installation in accordance with Manufacturer's installation instructions.
 4. Upon completion, the equipment shall be clean and left in perfect operating condition.
- H. Paging System Cabling
1. Plenum System Cable sheath shall be white in color.
 2. Contractor shall furnish and install the cabling as indicated on the technology drawings, and associated equipment schedules and diagrams.
 3. Contractor shall furnish installation in accordance with Manufacturer's installation instructions.
 4. Contractor shall energize and commission equipment in accordance with manufacturer instructions.
 5. Contractor shall provide final adjustments to the system. Upon completion, the system shall be clean, adjusted and left in perfect operating condition.
- I. Administrative Handsets
1. Each dialing administrative telephone in the system shall be programmable for the following options:
 - a. Allow zone paging
 - b. Allow paging of individual rooms
 - c. Allow All-Page announcements
 - d. Allow Executive Override
 - e. Allow Emergency Paging
 - f. All activation of Time Zone tones
 - g. Set the priority level and target display or "normal" calls
 - h. Set the priority level and target display of "emergency" calls
 - i. Assignment of architectural number
 - j. Class of service
 - k. Assignment of associated speaker to paging zone
 - l. Automatic Call-Back Busy
 - m. Call Forward-No Answer
 - n. Call Forward-Busy

J. Zoning

1. Zoning shall be coordinated with Fort Bend ISD. Additional and separate zoning codes shall be provided, and each location shall be programmed in software to belong to any combination of software codes. Initially codes shall be provided for the following:
 - a. Building 2 general corridors
 - b. Building 2 all call
 - c. ACC dep
 - d. Intake
 - e. RDSPD
 - f. Admin suite
 - g. Resource
 - h. ATVI
 - i. Building 3 all call
 - j. Building 3 general corridors
 - k. One zone for outside speakers
2. PA is programmed so that it can page individual rooms in the building as well as page by zones. Provide 2-way communications to every interior occupied space. Exterior spaces do not require 2-way communication.

K. Public Address System Integration with Classroom Audio Visual Systems

1. Classroom Audio Visual systems shall be installed and configured to mute program audio during paging events. This functionality requires coordination between the Public Address System Contractor [275100] and the Audio Visual Systems Contractor [274100]
2. The Public Address System Contractor shall provide and install cabling from the classroom Public Address speaker to the equipment enclosure/amplifier location. This cable shall be terminated and connected to the AV system by the Audio Visual Systems Contractor. The Public Address System Contractor shall work with the Audio Visual systems Contractor to ensure that the interconnection and associated functionality are fully tested and operational.

L. Public Address System Integration with Classroom

1. The Public Address System Contractor shall provide and install cabling from the classroom Public Address speaker to the equipment enclosure/amplifier location. The Public Address System Contractor shall coordinate with FBISD to ensure that the interconnection and associated functionality are fully tested and operational
2. Provide 2-way communications to every interior occupied space. Exterior spaces do not require 2-way communication.
3. Provide activation of security monitoring functions on a per room basis and per zone basis. Amplified two-way voice communications shall be available from any dial phone in the system, through any speaker in the system. This shall allow hands-free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is open and a supervisory tone shall sound at regular intervals when speaker monitoring is active.

M. Public Address System Integration with Phone System

1. Provide a programmable and addressable system to every occupied space and to the exterior of the building.
2. Provide 2-way communications to every interior occupied space. Exterior spaces do not require 2-way communication.
3. Provide activation of security monitoring functions on a per room basis and per zone basis. Amplified two-way voice communications shall be available from any dial phone in the system, through any speaker in the system. This shall allow hands-free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is open and a supervisory tone shall sound at regular intervals when speaker monitoring is active.
4. The public address system shall provide for bell changes and shall be capable of storing events, schedules, programmable holidays, bells silenced, etc.
5. Provide for integration with the synchronized wireless clock system.
6. Provide for integration with the audio | visual systems allowing for "Priority Page Override" capability.
7. Provide data network cables as required for network connectivity.
 - a. Installed per DIV. 27 cabling specifications.
8. The public address system shall be provided with a UPS with a 60-minute capacity.
9. The public address system shall be connected to the emergency generator, when available.
10. The public address system must integrate with the Fort Bend ISD Cisco VoIP phone system.
 - a. An FXO interface will not be accepted.
 - b. A SIP interface the public address system manufacturer certifies will work with the Cisco Call Manager 12.0 is preferred. If a SIP interface is not available, provide a Viking RAD-1A, a Cisco ATA190 and an analog phone for testing.

- 1) Fort Bend ISD will configure the ATA190 on the Cisco Call Manager.
 - 2) The Contractor will configure the Viking RAD-1A and make the interconnection between the network switch, Cisco ATA190, Viking RAD-1A and Public Address System.
11. Provide for the increase of stations by 25 percent above those required for the initial design without adding any internal or external components.
 12. The public address system shall be located inside room D106M and any mechanical rooms for an intermittent cross connection. Contractor shall coordinate with Architect/owner and Design Consultant for any mechanical rooms for an intermittent cross connection. All wall mounted equipment shall be mounted on fire rated plywood with dedicated electrical receptacles located next to the panels on the fire rated plywood.
- N. Wireless Clock System
1. The master clock shall provide but not be limited to the following functions:
 - a. Up to (16) programmable schedules.
 - b. Selection of any of (16) schedules to allow flexibility due to seasonal changes or special events.
 - c. Bells to be silenced or special schedules to be implemented for special events.
 - d. Non-volatile memory capacity for storing up to 500 events and up to 100 calendar dates for schedule changes.
 - e. Ability to review, edit and delete events via Windows PC running the configuration program.
 - f. Events shall be programmable to any or all zone circuits.
 - g. User programmable Automatic Daylight-Saving Time Change
 - h. Separate bell tone selection and separate bell duration for each event
 2. The wireless clock system shall maintain synchronized time and transmit over wireless radio frequency from a master clock transceiver to secondary clocks.
 3. The wireless clock system shall integrate into the public address system and bell schedule to provide for storing events, schedules, programmable holidays, bells silenced, etc.
 4. The wireless clock system shall function autonomously, meaning it does not rely on Wi-Fi or Bluetooth technology.
 5. It is preferred the wireless clock system does not require an FCC license. If an FCC license is required, it shall be provided by the manufacturer/integrator of the wireless clock system.
 6. The wireless clock system must be integrated with the Public Address System
 7. The wireless clock system shall provide full coverage of the entire facility.
 8. Digital Clocks
 - a. All digital clocks shall provide a (4) digit display with 4-inch digits
 - b. Provide single face digital clocks at the following locations:
 - 1) Gymnasium (Provide Wire Guard)
 - 2) Cafeteria
 - 3) Dining Area
 - 4) Library
 - 5) Rooms over 2,500 sq. ft.
 9. Provide dual face digital clocks at the following locations:
 - a. Secondary Schools
 - 1) Corridors
- O. Cable Support
1. All cables shall be installed and supported in conduit systems, cable trays, cores, sleeves, etc. as indicated in the technology drawings.
 2. When cables leave the main pathway systems as indicated on the technology drawings, they shall be installed and supported in Contractor furnished and installed j-hooks.
 3. No cable pathway shall exceed 40% fill ratio.
 4. The contractor shall furnish a separate j-hook pathway for each cable type (data, voice, video, pa, and security).
 5. J-hooks shall be installed no more than five feet (5') apart on center, using only manufacturer approved installation methods and hardware.
 6. J-hooks shall be furnished with closure clips.
 7. Maximum spacing between supports shall not exceed twelve inches (12").
 8. All pathways shall be sized according to the manufacturer specifications and provide for 30% growth without exceeding the 40% fill rate.
 9. All cabling shall be properly supported from the structure using j-hooks.
 10. J-hooks shall be installed every 4.5 feet on center starting at the end of the wire basket cable tray.
 11. J-hooks cable supports shall be installed no higher than 3 feet above the accessible ceiling to allow for ease of access for future moves, adds and changes
 12. J-hooks shall be installed utilizing appropriate hardware to support, join and attach j-hooks to structures.

13. No rigid wire shall be utilized for support only use solid supports clips, all thread, anchors, etc.
14. Provide spare conduits at bulk heads, furr downs and at hard ceiling areas separating sections of buildings. Intent is to provide a future cabling pathway through inaccessible areas.
15. All labels for public address system cabling shall be typed not handwritten
16. Contractor shall establish j-hook and saddle strap pathways and shall coordinate pathways with all other disciplines. Under no circumstances shall these pathways be used to support other low-voltage applications not included in this specification.
17. Cable Dressing
 - a. No nylon cable ties shall be used at any time during the installation of the cable.
 - b. Above Ceiling
 - 1) Contractor shall furnish and install plenum-rated hook & loop straps in plenum-rated airspaces.
 - a) The Contractor shall install no more than (1) hook & loop strap between each j-hook or saddle strap or at service loop locations.
 - c. Equipment Rooms / Telecommunications Rooms
 - 1) The Contractor shall bundle all visible cables with Contractor furnished and installed hook & loop straps.
 - a) Hook & loop straps shall be installed twenty-four (24) inches apart on center.

3.06 TRAINING REQUIREMENTS

A. Public Address and Clock Systems Training

1. Contractor shall provide a proposed training schedule to the Architect/Design Consultant prior to substantial completion.
2. Contractor shall provide a test report showing the system has been 100% tested and is 100% operational prior to training demonstration.
3. Contractor shall provide a proposed training syllabus for both administrative users and end-users prior to substantial completion.
4. Contractor shall provide a "user's manual" written specifically for the school personnel onsite, for daily routine operations of the system. The user manual shall be turned over to the Owner's representatives at the time of training.
5. Training shall include all aspects of the Public Address and Clock systems as specified and installed. Contractor shall include provisions within the total cost proposal for a minimum of one (1) System Administrator training session. It is anticipated this training will cover advanced functions of the system, basic troubleshooting techniques and other subject matter pertinent to the on-going support of the systems at the installed facility.
6. Contractor shall include provisions with the total cost proposal for a minimum of two (2) End-user training sessions. These sessions shall be a minimum of four hours. It is anticipated this training will cover basic function and operation of the system by faculty. This would include event display management, source control and general systems operation for all installed systems.

3.07 TESTING REQUIREMENTS

A. Distributed Audio Communication Systems Testing

1. Contractor shall unpack and pre-test equipment prior to installation into the production environment. All configurations shall be re-verified prior to the units being placed into service.
2. Contractor shall test and commission each component per the specifications and manufacturer's installation instructions.
3. Contractor shall test and verify for full operational and network support control functionalities and connections per the specifications and manufacturer's installation instructions.
4. **Contractor shall test SPL of each speaker with a Sound Level Meter and ensure SPL is 15Db above ambient noise level for the type of room the speaker is installed in. Submit testing results and SPL as part of as built documentation.**
5. All network devices shall be verified for link and auto negotiation to the highest connection rate.
6. Contractor shall test and verify all audio functionalities as installed per the specifications and manufacturer's installation instructions.

3.08 PROJECT CLOSEOUT DOCUMENTATION

A. As-Built Drawings

1. Drawings shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect/Design Consultant.
2. Three (3) sets of drawings depicting the condition of the audio-visual system as installed.
3. Electronic pdf as-built drawings in 11 inch x 17 inch format will be required for final closeout of the project. Close out drawings must include details indicating the actual wiring layout and installed locations of all devices such as speakers, call buttons, handsets, Speaker SP-le, etc. Close out drawings must also include model numbers and serial numbers of all equipment installed. Laminated PDF copies ARCH C (18" X 24") of the as-built drawings shall be mounted next to the panels in the MDF IDF rooms.

4. As-Built drawings shall be produced in AutoCAD 2010 or higher and provided in hardcopy and electronically in .dwg and PDF format.
 5. Hardcopy drawings shall be provided in the original size as issued by the Architect/Design Consultant.
 6. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect/Design Consultant.
 7. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of all projectors, projector mounts, projection screens, wall elevations, cable tray, sleeves, pathways, workstation locations, and labeling scheme.
- B. Contractor's Statement of Warranty
1. Statement of warranty shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect/Design Consultant.
 2. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor and workmanship starting at final system acceptance.
 3. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.

END OF SECTION 275100

SECTION 28 00 00 – COMMON ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The requirements contained in this Section apply to all Sections of this Division.

1.02 SUMMARY

- A. This section includes general design requirements, administration topics, and installation for communications systems.

- B. Section Includes:

1. Common terminology and requirements used throughout this Division.
2. Identification and labeling.
3. Firestop systems.
4. Sleeves for raceways and cables.
5. Grout.

- C. Related Sections include the following:

1. Division 27 Section "Grounding and Bonding for Communications Systems"
2. Division 27 Section "Pathways for Communications Systems"
3. Division 27 Section "Cable Trays for Communications Systems"
4. Division 27 Section "Communications Racks, Frames and Enclosures"
5. Division 27 Section "Communications Optical Fiber Backbone Cabling"
6. Division 27 Section "Communications Copper Horizontal Cabling"

1.03 SYSTEM DESCRIPTION

- A. The objective of this project is to provide complete electronic safety and security systems installation including, but not limited to:

1. Access Control System.
2. Intrusion Detection System.
3. Video Surveillance System.
4. Digital Addressable Voice Evacuation Fire Alarm System.

1.04 GENERAL

- A. The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub-Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- B. Each Contractor shall be governed by any alternates, unit prices and addenda or other contract documents insofar as may affect the work or services.
- C. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of the complete and operating Electronic Safety and Security System(s) indicated and/or specified in the Contract Documents.
- D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Electronic Safety and Security Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.
- E. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensation.
- F. It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime agreement, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the Contractor to the Architect (if applicable), then to the Engineer.
- G. This section of the Specifications or the arrangement of the Contract Documents shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.
- H. It is the intent of this Contract to deliver to the Owner a new and complete project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

- I. In general, and to the extent possible, all work shall be accomplished without interruption of facility operations. The Contractor shall advise the Architect, Owner and Engineer in writing at least one week prior to the deliberate interruption of any services. The Owner shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.
 - J. Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without requests for extra compensation to the Owner, except where otherwise provided for in the contract for the work.
- 1.05 DEFINITIONS
- A. AHJ: Authorities Having Jurisdiction.
 - B. Architect: The Architect of Record for the project, if any.
 - C. Business Day: Where this Section and other Sections of this Division use the term "Business Day" it shall mean Monday thru Friday, excluding Holidays recognized by Federal, State and Local government.
 - D. Contract Documents: All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to, plans, specifications, addenda, instructions to bidders (both General and Sub-Contractors), unit prices, shop drawings, field orders, change orders, cost breakdowns, construction manager's assignments, architect's supplemental instructions, periodical payment requests, etc.
 - 1. Note: Any reference within these specifications to a specific entity, i.e. "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity. Such assignments of responsibility are the responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.
 - E. Contractor: Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of low-voltage communications work (Electrical, Low Voltage, Fire Alarm, etc.) or, the General Contractor.
 - F. Engineer: The Consulting Mechanical-Electrical Engineers either consulting to the Owner, Architect, other Engineers, etc.
 - G. Furnish: Deliver to the site in good condition.
 - H. Install: Install equipment furnished by others in complete working order.
 - I. Provide: Furnish and install in complete working order.
 - J. RS-232: A TIA standard for asynchronous serial data communications between terminal devices.
 - K. RS-485: A TIA standard for multipoint communications using two twisted-pairs.
 - L. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
- 1.06 DRAWINGS AND SPECIFICATIONS
- A. The Drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work.
 - B. The Drawings and Specifications are intended to supplement each other. No Contractor shall take advantage of conflict between them, or between parts of either. This also includes potential conflicts with regards to equipment and material model numbers, part numbers, etc. and respective description and/or performance. Should this condition exist, the Contractor shall request a clarification not less than 10 days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.
 - C. The Drawings and Specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.
 - D. Contractor shall make all necessary and required measurements in the field and shall be responsible for correct fitting. The work shall be coordinated with all other branches of work in such a manner as to cause a minimum of conflict or delay.
 - E. The Engineer shall reserve the right to make adjustments in location of conduit, j-hooks, devices, etc. where such adjustments are in the interest of concealing work or presenting a better appearance. Unless a formal proposal request is issued, this work shall be performed without additional cost to the Owner.
 - F. Each Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Communications equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.
 - G. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

- H. The Drawings are intended to show the approximate locations of equipment, materials, devices, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to ensure no conflict with other work. In case of conflict between small and large scale drawings, the larger scale drawings shall take precedence.
 - I. Where on the Drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
 - J. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work without additional cost to the Owner, the same as if herein specified or indicated.
 - K. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.
- 1.07 SUBSTITUTION PROCEDURES
- A. Comply with provisions of Division 01 Section "Substitution Procedures".
 - B. Substitution may be considered when a product becomes unavailable through no fault of the Contractor.
 - C. If an alternate material is proposed that is equal to or exceeds specified requirements, Contractor shall provide manufacturers' specifications in writing for Owner approval prior to purchase and installation.
 - D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
 - E. Substitutions of material by the Contractor shall be in writing complete with written manufacturers' specifications. The material substituted shall not void, alter or change manufacturers' structured cabling system warranty.
 - F. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
 - G. The Owner will be the final judge of acceptability, with review by Engineer and the distribution of the acceptance by the Architect.
 - 1. No substitute shall be ordered, installed or utilized without the Architect's prior written verification of acceptance from the Owner.
- 1.08 QUALITY ASSURANCE
- A. Regulatory Requirements
 - 1. Contractor shall supply all city, county, and state telecommunication cabling permits required by appropriate governing agency.
 - 2. Contractor shall be state-licensed and/or bonded as required for low voltage structured cabling systems.
 - B. Certifications
 - 1. Contractor shall submit an up-to-date and valid certification verifying qualifications of the Contractor and installers to perform the work specified herein at time of bid submission.
 - 2. Contractor shall have a complete working knowledge of low voltage cabling applications such as, but not limited to data, voice and video network systems.
 - 3. Contracting firm shall have installed similar-sized systems in at least ten (10) other projects in the last five (5) years prior to this bid and be regularly engaged in the business of installation of the types of systems specified in this document.
 - a. Certification shall include, but not be limited to, items such as name and location of project contacts and numbers, total square footage, total number of cables/drops, types of media, etc.
 - 4. Contractor shall provide certificates for the appropriate insurance coverage as defined in contract documents.
 - 5. All installer personnel that will be assigned to this project shall be listed in the qualification questionnaire document.
 - 6. 80% shall have a minimum of three (3) years' experience in the installation of the types of systems, equipment, and cables specified in this document prior to this bid.
 - a. Any personnel substitutions shall be noted in writing to Owner prior to commencement of work.
 - 7. Contractor shall submit evidence of compliance with these requirements prior to beginning work on the project.
 - 8. Cabling installers shall be trained and certified by the cable manufacturer for telecommunication cabling installations and maintenance of said materials.
 - 9. Maintain current status with the warranting manufacturer, including all training requirements, for the duration of the cable infrastructure project. Staff each installation crew with the appropriate number of trained personnel, in accordance with their manufacturer/warranty contract agreement, to support the lifetime system warranty requirements. After installation, submit all documentation to support the warranty in accordance with the manufacturer's warranty requirements, including test results, and to apply for said warranty on behalf of the customer. The system warranty will cover the components and labor associated with the repair/replacement of any failed link as a result of a defective product when a valid warranty claim is submitted within the warranty period.
 - C. Administrative Requirements and Coordination requirements

1. Coordinate work of this section with Owner's telephone system specifications, workstations, equipment suppliers, and installers.
 2. Coordinate installation work with other crafts (examples include ceiling grid contractors, HVAC and sheet metal contractors, etc) to resolve procedures and installation placement for cable trays and cable bundle pathways.
 - a. The goal of this coordination will be to establish priority pathways for critical data/voice network cable infrastructure, materials, associated hardware, as well as mitigate delays to the project and to allow service access for communications and HVAC components.
 - b. Damage by Contractor to the craft work of others will be remedied at the Contractor's expense in a timely manner.
 3. Exchange information and agree on details of equipment arrangements and installation interfaces.
 - a. Record agreements reached in meetings and distribute record to other participants, Owner and telecommunication consultant.
 4. Adjust arrangement and locations of distribution frames, patch panels, and cross-connect blocks in equipment rooms and racks to accommodate and optimize arrangement and space requirements of any service provider equipment, telephone system, and LAN equipment.
 - a. Tasks shall be coordinated with Owner or his representative, and other trades' installation representatives.
 5. When requested by Owner or Owner's representative, furnish extra materials that match specified products and that are factory packaged with protective covering for storage and identified with labels describing contents.
- D. Common Requirements for Material Quality: Materials, equipment and devices shall be new and of the quality specified and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall be replaced with new materials, equipment or devices identical with those damaged, unless approved otherwise by the Owner in writing.
- E. Common Requirements for Code Compliance: In case where differences occur between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. Perform the following:
1. Promptly notify the Architect in writing of any such difference.
 2. Obtain approval from Architect before proceeding with the Work.
 3. Should the Contractor perform any work that knowingly does not comply with local codes, laws and ordinances, industry standards, or other governing regulations; the Work shall be corrected at no cost to the Owner.
- F. Common Requirements for Compliance with AHJ Instructions: In cases where the Authority Having Jurisdiction requires deviations from the requirements of the Contract Documents, perform the following:
1. Promptly notify the Architect in writing of any such difference.
 2. Obtain approval from Architect before proceeding with the Work.
- 1.09 DELIVERY, STORAGE, AND HANDLING
- A. Coordination with delivery companies, drivers, site address, and contact person(s) will be the responsibility of the Contractor.
 - B. Contractor requirements:
 1. Be responsible for prompt material deliveries to meet contracted completion date.
 2. Coordinate deliveries and submittals with the General Contractor to ensure a timely installation.
 3. No equipment materials shall be delivered to the job site more than three weeks prior to the commencement of its installation.
 4. Equipment shall be delivered in original packages with labels intact and identification clearly marked.
 5. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.
 6. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants.
 - a. Equipment damaged prior to system acceptance shall be replaced at no cost to the Owner.
 7. Contractor shall be responsible for all handling and control of equipment. Contractor is liable for any material loss due to delivery and storage problems.
 - C. Owner/General Contractor shall supply a list of security requirements for Contractor to follow.
- 1.10 PROJECT/SITE CONDITIONS
- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Contractor will remove burrs, dirt, and construction debris.
 1. If applicable, the Contractor will repair damaged finishes, including chips, scratches, and abrasions.
 - B. Contractor shall provide daily a clean work environment, free from trash/rubbish accumulated during and after cabling installation.
 - C. Contractor shall keep all liquids (drinks, sodas, etc.) off finished floors, carpets, and tiles.
 1. If any liquid or other detriment (cuts, soils, stains, etc.) damages the above finishes, Contractor shall provide professional services to clean or repair scratched/soiled finishes, at Contractor's expense.

1.11 COORDINATION

- A. In describing various materials, equipment and devices, in general each item may be described singularly, even though there may be a multiplicity of identical items. Also, where the description is general in nature, the exact sizes, duties, space arrangements, and other requirements must be obtained by reference to other portions of Contract Documents.
- B. Space allocations for materials, equipment and devices have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer. Verify that all materials, equipment and devices proposed for use on this Project are within the constraints of the allocated space.
- C. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- D. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- E. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Firestopping" and in this Section.
- F. Roof-Mounted Equipment: Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

1.12 WARRANTY

- A. Contractor shall provide a minimum one (1) year warranty on installation and workmanship.

1.13 MAINTENANCE

- A. Support Availability: The Contractor shall commit to make available local support for the product and system during the Warranty or Extended Warranty period.

PART 2 - PRODUCTS

2.01 IDENTIFICATION (LABELING) SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Brady
 2. Brother
 3. Dymo
 4. Hellerman-Tyton

2.02 FIRESTOP SYSTEMS

- A. General:
 1. Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
 2. Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- B. Manufacturers: Subject to compliance with requirements and with through-penetration firestop systems listed in Volume 2 of the UL Fire Resistance Directory, provide products by Specified Technologies, Inc. (STI) or Engineer approved equal.
- C. Materials:
 1. Firestop Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
 - a. STI SpecSeal Series SSS Sealant.
 - b. STI SpecSeal Series LCI Sealant.
 2. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
 - a. STI SpecSeal Series SSP Putty.
 3. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
 - a. STI SpecSeal Series SSB Pillows.
 4. Fire-Rated Cable Grommet: Molded, two-piece grommet with an integral fire and smoke sealing foam membrane for sealing individual cable penetrations through framed wall assemblies. Grommet snaps together around cable and locks tightly into the wall. The following products are acceptable:
 - a. STI EZ-Firestop Grommets.
 5. Fire-Rated Cable Pathways: Device modules comprised of steel pathway with self-adjusting intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:
 - a. STI EZ-PATH Fire Rated Pathway.

- 2.03 SLEEVES FOR RACEWAYS AND CABLES
- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, with burrs removed and insulating bushing fittings on ends.
 - B. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.
- 2.04 GROUT
- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.01 STRUCTURED CABLING SYSTEM INSTALLERS

- A. The Contractor shall be a certified Manufacturer's Authorized Installer and provide an end-to-end product warranty, adhere to the industry standard engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this project.
- B. Provide and pay for all labor, supervision, tools, equipment, test equipment, tests and services to provide and install a complete inside and outside plant fiber and copper infrastructure system. Pay all required sales, gross receipts, and other taxes.
- C. Furnish all labor, supervision, tooling, miscellaneous mounting hardware and consumables for each cabling system installed. Maintain current status with the warranting manufacturer, including all training requirements, for the duration of the cable infrastructure project. Staff each installation crew with the appropriate number of trained personnel, in accordance with the manufacturer/warranty contract agreement to support the lifetime system warranty requirements.
- D. After installation, submit all documentation to support the warranty in accordance with the manufacturer's warranty requirements, including test results, and to apply for said warranty on behalf of the Owner. The system warranty will cover the components and labor associated with the repair/replacement of any failed link as a result of a defective product when a valid warranty claim is submitted within the warranty period.
- E. Establish a single point of contact (POC) with the Owner who will be responsible for reporting progress and updating the Owner's technical representative with issues that the Owner must address to facilitate the cabling system installation. POC shall provide daily written reports to the Owner's technical representative detailing progress. Requests for access to limited access or restricted areas shall be made three days prior to the required access. Information critical to the completion of the task or project shall be communicated to the Owner's technical representative as the requirement becomes known. Casual information shall be passed during the scheduled progress report.
- F. Maintain the Owner's facility in a neat and orderly manner during the installation of the communications cabling system. The Owner's facilities shall be maintained in broom clean condition at the completion of work each day. At the completion of work in each area, perform a final cleaning of debris prior to moving the installation crew to the next work area.
- G. All members of the installation team shall be certified by the Structured Cabling Manufacturer System Performance Warranty provider as having completed the necessary training to complete their part of the installation and capable of an installation that falls under manufacturer's guidelines necessary to obtain the Manufacturer's System Performance Warranty.
- H. A BICSI RCDD shall supervise and approve all on-site work as a recognized member of the Contractor's installation team. All installation team members must demonstrate knowledge and compliance with all BICSI, TIA, UL, and NEC methods, standards and codes.

3.02 STRUCTURED CABLING SYSTEM INSTALLATION

- A. Allowable Cable Bend Radius and Pull Tension:
 - 1. In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation.
 - 2. Refer to cable manufacturer's bend radius recommendations for the maximum allowable limits.
 - 3. After installation, exposed cable and other surfaces must be cleaned free of lubricant residue. Use only lubricants specifically designed for cable installation.
- B. Pull Strings:
 - 1. Horizontal cable requirements
 - a. Provide pull strings in all new conduits, including all conduits with cable installed as part of this contract.
 - b. Pull string shall have a rated average breaking strength of 200 lbs.
 - c. Data and video cables can be pulled in tandem with pull strings.
 - d. During pulling sessions, pull strings must move freely to prevent cable jacket/cable damage.
- C. Conduit Fill: Reference manufacturer's Design Installation Guidelines manual.
- D. Patch cables: Refer to Division 27 Section "Communications Copper Horizontal Cabling".

- E. All material and equipment as provided should be the standard Commercial-Off-The-Shelf (COTS) products of a manufacturer engaged in the manufacturing of such products.
 - 1. All material and equipment shall be typical commercial designs that comply with the requirements specified.
 - 2. All material and equipment shall be readily available through manufacturers and/or distributors.
 - F. All equipment shall be standard catalogued items of the manufacturer and shall be supplied complete with any optional items required for proper installation.
 - G. Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance and backward compatibility.
 - H. Expansion Capability: Unless otherwise indicated, provide spare conductor pairs in cables, positions in patch panels, cross connects, and terminal strips, and space in cable pathways and backboard layouts to accommodate 20% future increase in campus distribution and active workstations.
 - I. Backward Compatibility: The provided solution shall be backward compatible with lower category ratings such that if higher category components are used with lower category components, the basic link and channel measures shall meet or exceed the lower channel's specified parameters.
 - J. Component Compliance: The provided solution's components shall each meet the minimum transmission specifications listed herein such that no individual component will be less than specifications for permanent link and channel, regardless of the fact that tests for link and channel ultimately meet required specifications.
 - K. In the event of a breach of the representations and warranties contained herein, the Contractor, at their own expense, shall take all measures necessary to make the cabling system work and comply with the applicable manufacturer written technical recommendations and standards.
 - L. Owner's technical representative will make periodic inspection of the project in progress. One inspection will be performed at the conclusion of cable pulling, prior to closing of the false ceiling to inspect the method of cable routing and support and the firestopping of penetrations. A second inspection will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with the ANSI/TIA-568-C standards for jacket removal and pair untwist, compliance with manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly.
- 3.03 EXAMINATION
- A. Field Measurements
 - 1. Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on shop drawings.
 - 2. Coordinate fabrication schedule with construction progress to avoid delaying the work.
 - B. Established Dimensions
 - 1. Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating units without field measurements.
 - 2. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.
- 3.04 PREPARATION
- A. Contractor's RCDD shall review, approve and stamp all Shop Drawings, Submittal Documents, Coordination Drawings and As Built Drawings.
 - B. Pre-Installation Inspection:
 - 1. Contractor shall visually inspect all cables, cable reels, and shipping cartons to detect possible cable damage incurred during shipping and transport.
 - 2. Visibly damaged goods are not acceptable and shall be replaced by the Contractor at no additional cost to the Owner.
- 3.05 LABELING
- A. Cable labels: Self-adhesive vinyl or vinyl-cloth wraparound tape markers, machine printed with alphanumeric cable designations.
 - B. Flat-surface labels: Self-adhesive vinyl or vinyl-cloth labels, machine printed with alphanumeric cable designations.
 - C. Provide transparent plastic label holders, and 4-pair marked colored labels.
 - D. Install colored labels according to the type of field as per ANSI/TIA 606-A color code designations.
 - E. Use ANSI/TIA 606-A: "designation strip color-code guidelines for voice, data, cross- connect, riser, and backbone fields"
 - F. Provide self-adhesive, color-coded, identification marker on ceiling grid directly below any device requiring an IP-connection or service above the ceiling. Ceiling marker to be Seton L12723 or equivalent. Fire alarm related devices should utilize a red identification marker on the ceiling grid. Security related devices should utilize a black identification marker on the ceiling grid.
- 3.06 CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATION, ETC.
- A. Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, extensions, etc. in connection with his work.

- B. Contractor shall file all necessary plans, utility easement requests and drawings, survey information on line locations, load calculations, etc. prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.
- C. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall be versed in all Codes, Rules and Regulations pertinent to the work prior to submission of a proposal.
- D. Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.
- E. Where minimum code requirements are exceeded in the Design, the Design shall govern.
- F. Ensure that the work is accomplished in accordance with the OSHA Standards and any other applicable government requirements.
- G. All work relating to the handicapped shall be in accord with regulations currently enforced by the Authority Having Jurisdiction.
- H. Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.

3.07 CUTTING AND PATCHING

- A. Unless otherwise indicated or specified, each Contractor shall provide cutting and patching necessary to install the work specified in this Division. Patching shall match adjacent surfaces to the satisfaction of the Engineer and shall be in accord with the Architect's standards for such work, as applicable.
- B. Each Contractor shall be responsible for all openings, sleeves, trenches, etc. that he may require in floors, roofs, ceilings, walls, etc. and shall coordinate all such work with the General Contractor and all other trades. Contractor shall coordinate with the General Contractor any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the responsible Contractor.
- C. Each Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for conduit, conductors, wireways, etc. to go through; however, when this is not done, this Contractor shall do all cutting and patching as well as reinforcement required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Engineer. Any damage caused to the buildings by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.
- D. Cut holes in casework, equipment panels, etc. (if any), as required to pass pipes in and out.
- E. Notify other trades in due time where openings of chases in new concrete or masonry are required. Set all concrete inserts and sleeves for work. Failing to do this, cut openings for work and patch same as required at own expense.
- F. Openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.
- G. No structural members shall be cut without the approval of the Structural Engineer and all such cutting shall be done in a manner directed by him.
- H. Each Contractor shall be responsible for properly shoring, bracing, supporting, etc. any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Engineer.
- I. All work improperly done or not done at all as required by the Communications trades in this section will be performed by the General Contractor at the direction of the Contractor whose work is affected. The cost of this work shall be paid for by the Contractor responsible.

3.08 SLEEVES AND PLATES

- A. Provide and locate all sleeves and inserts required for work before the floors and walls are built or be responsible for the cost of cutting and patching required where sleeves and inserts were not installed, or where incorrectly located. Each Contractor shall do all drilling required for the installation of his hangers. Drilling of anchor holes may be prohibited in post-tensioned concrete construction, in which case the Contractor shall request approved methods from the Architect and shall carefully coordinate setting of inserts, etc., with the Structural Engineer and/or Architect.
- B. Galvanized steel sleeves shall be provided for all communications conduit passing thru concrete floor slabs and concrete, masonry, tile and gypsum wall construction.

- C. Cast iron sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking with lead and oakum between pipe and sleeve for waterproofing.
 - D. In all cases, sleeves shall be at least two pipe sizes larger than nominal pipe diameter.
 - E. Where conduit motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:
 1. Terminate sleeves flush with walls, partitions and ceiling.
 2. In areas where pipes are concealed, as in chases, terminate sleeves flush with floor.
 3. In all areas where pipes are exposed, extend sleeves ½ inch above finished floor, except in rooms having floor drains, where sleeves shall be extended ¾ inches above floor.
 - F. Sleeves shall be constructed of 24-gauge galvanized sheet steel with lock seam joints for all sleeves set in concrete floor slabs terminating flush with the floor. All other sleeves shall be constructed of galvanized steel pipe unless otherwise indicated on the drawings.
 - G. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction occurs around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction. Fire and smoke stop all sleeves in a manner approved by the local authority having jurisdiction or per prevailing codes.
 - H. Sleeves passing through exterior wall (none are permitted thru roof) or where there is a possibility of water leakage and damage shall be caulked water tight for horizontal sleeves and flashed and counter-flashed with lead (4 lb.) or copper and soldered to the piping, lapped over sleeve and properly weather sealed. All roof penetrations shall be made inside mechanical equipment curbs.
 - I. All rectangular or special shaped openings in plaster, stucco or similar materials including gypsum board shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirements is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for lighting fixtures, panels, etc. Lintels shall be provided where indicated over all openings in bearing walls, etc.
- 3.09 WEATHERPROOFING
- A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect and/or Engineer before work is done. Furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.
 - B. Wherever work penetrates roofing, it shall be done in a manner that will not diminish or void the roofing guarantee or warranty in any way. Coordinate all such work with the roofing installer.
- 3.10 FIRESTOPPING
- A. Refer to Division 07 Section "Firestopping" for additional requirements.
 - B. Preparation:
 1. Examination of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.
 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 4. Do not proceed until unsatisfactory conditions have been corrected.
 - C. Through-Penetration Firestop System Installation:
 1. Install through-penetration firestop systems in accordance with the conditions of testing and classification as specified in the published design.
 2. Comply with manufacturer's instructions for installation of through-penetration firestop systems products.
 3. Seal all openings or voids made by penetrations to ensure an air and water resistant seal.
 4. Protect materials from damage on surfaces subjected to traffic.
 - D. Do not penetrate rated fire walls, ceilings or floors with conduit, cable, wireway or other raceway system unless all penetrations are protected in a code compliant manner which maintains the fire-rating of the assembly. Firestop all openings made in walls, chases, ceilings and floors. Patch all openings around conduit, wireway, etc., with appropriate type material to provide needed fire rating at fire walls, ceilings and floors. Fire proofing materials and method of application shall be approved by the local authority having jurisdiction.
 - E. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly.
 - F. Apply putty pads to boxes located in fire-rated wall assemblies in which a horizontal distance of greater than 24" between boxes is not maintained.
 - G. Install and seal penetrations (conduit, sleeves, slots, chases) into or through fire-rated barriers created by or made for or on the behalf of the Contractor to prevent the passage of smoke, fire, toxic gas, or water through the penetrations.

- H. Coordinate firestopping procedures and materials with General Contractor.
 - I. Solutions and shop drawings/submittals for firestop materials and systems shall be presented to the General Contractor for written approval of materials/systems prior to purchase and installation.
 - J. Following the pathway of others through compliant and non-compliant penetrations does not remove the requirement to maintain code-compliant firestopping.
 - K. Supply Owner with training manuals with instructions on methods of adding or removing cabling to/from firestopped sleeves and chases.
 - L. Provide manufacturer recommended material for rated protection for any given barrier.
 - M. Laminate and permanently affix adjacent to chases the following information:
 1. Manufacturer of firestop system
 2. Date of installation/repair.
 3. Part and model numbers of system and all components
 4. Name and phone numbers of local distributor and manufacturer's corporate headquarters
 - N. The material chosen shall be distinctively colored to be clearly distinguishable from other materials, adhere to itself, and maintain the characteristics for which it is designed to allow for the removal and/or addition of communication cables without the necessity of drilling holes in the material.
- 3.11 TESTING
- A. Upon completion of the communications infrastructure systems, including all pathways and grounding, the Contractor shall test the system.
 1. Cables and termination modules shall be affixed, mounted or installed to the designed/specified permanent location prior to testing.
 2. Any removal and reinstallation of any component in a circuit, including faceplates, shall require retesting of that circuit and any other disturbed or affected circuits.
 3. Cable/jack shall be affixed, mounted or installed to the designed/specified permanent location prior to testing.
 - a. Any removal and reinstallation of any component in the circuit shall require retesting of that circuit.
 4. Approved instruments, apparatus, services, and qualified personnel shall be utilized.
 5. If tests fail, Contractor shall correct as required to produce a legitimate passing test.
 6. Manipulation of tester parameters on a failing test in order to achieve a passing test is unacceptable.
 7. If the Contractor is found to have manipulated or falsified any failing test result to show a "PASS" for any reason (without written notice and prior approval of the Owner), the Contractor shall be required to employ a Third-Party Testing Agent selected by the Owner to retest the complete cable plant and shall be required to pay all costs associated with this retesting.
 - B. These specifications will be strictly enforced.
 1. The Contractor must verify that the requirements of the specifications are fully met through testing with an approved tester (rated for testing parameters listed elsewhere), and documentation as specified below.
 2. This includes confirmation of requirements by demonstration, testing and inspection. Demonstration shall be provided at final walk-through in soft copy and printed test data.
 - C. Notification of the likelihood of a cable exceeding standardized lengths must be made prior to installation of the cable.
 1. Without contractor's prior written notice and written approval by the Owner, testing that shows some or all pairs of cable not meeting specifications, shall be replaced at Contractor's expense (including respective connectors).
 2. With the Owner's written approval, the over-length cable(s) shall be excluded from requirements to pass standardized tests and shall be explicitly identified.
 - D. Testing is still required for non-compliant cabling.
 1. The tests shall be for wire-mapping, opens, cable-pair shorts, and shorts-to- ground.
 2. The test results must be within acceptable tolerances and shall be submitted with the Owner's acceptance document.
 - E. Contractor will complete all work and documentation according to manufacturer guidelines to ensure manufacturer's warranty remains in effect.
 1. Contractor shall obtain certificates from manufacturer attesting to warranty being in effect and include certificates with other deliverables due at the completion of the project.
 - F. Owner reserves the right to be present during any or all testing.
- 3.12 SCAFFOLDING, RIGGING AND HOISTING
- A. Furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required in strict accordance with OSHA Guidelines.
- 3.13 OPTION TO RELOCATE DEVICES
- A. The location of voice and data outlets and other similar devices along with their associated connections may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to rough-in or installation.

3.14 CLEANING

- A. Work areas will be kept in a broom clean condition throughout the duration of the installation process.
- B. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage.
- C. The Contractor will damp clean all surfaces prior to final acceptance by Owner.
- D. After completion of all work and before final acceptance of the work, thoroughly clean all equipment and materials and remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of equipment, fixtures and all other associated or adjacent fabrication.

3.15 ACCEPTANCE

- A. Once all work has been completed, test documentation has been submitted, and Owner is satisfied that all work is in accordance with contract documents, the Owner shall notify Contractor in writing of formal acceptance of the system.
- B. Contractor must warrant in writing that 100% of the installation meets the requirements specified herein (Standards Compliance & Test Requirements).
- C. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100% PASS rating, and receipt of full documentation soft and hard copies as describe herein.

3.16 INDEMNIFICATION

- A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

3.17 HAZARDOUS MATERIALS

- A. Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, insure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall insure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.
- B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.
- C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.
- D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

END OF SECTION 28 00 00

SECTION 28 05 03 – ELECTRONIC SAFETY AND SECURITY SHOP DRAWINGS AND SUBMITTALS

PART 1 - GENERAL

1.01 SHOP DRAWINGS AND SUBMITTALS

- A. Each Contractor shall submit to the Architect and/or Engineer, within thirty days after the date of the Contract, sets of shop drawings and/or manufacturer's descriptive literature (coordinate exact quantity with architectural specifications) on all equipment required for the fulfillment of his contract. Each shop drawing and/or manufacturer's descriptive literature shall have proper notation indicated on it and shall be clearly referenced per the specifications and/or schedules, etc., so that the Architect and/or Engineer may readily determine the particular item the Contractor proposes to furnish. All data and information scheduled, noted or specified by hand shall be noted in color red on the submittals. The Contractor shall make any corrections or changes required and shall resubmit for final review as requested. Review of such drawings, descriptive literature and/or schedules shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless they have, in writing, directed the reviewer's attention to such deviations at the time of submission of drawings, literature and manuals; nor shall it relieve them from responsibility for errors or omissions of any nature in shop drawings, literature and manuals. The term "as specified" will not be accepted.
- B. If the Contractor fails to comply with the requirements set forth above, the Architect and/or Engineer shall have the option of selecting any or all items listed in the specifications or on the drawings, and the Contractor will be required to provide all materials in accordance with this list.
- C. Review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the installing Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.
- D. The Engineer's review of shop drawings, schedules, product data or other required submittal data shall not relieve the Contractor from responsibility for the adaptability of the equipment or materials to the project, compliance with applicable codes, rules, regulations, information that pertains to fabrication and installation, dimensions and quantities, electrical characteristics, and coordination of the work with all other trades involved in this project.
- E. No cutting, fitting, rough-in, connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractors concerned. It shall be each Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. Each Contractor shall coordinate with all the other Contractors having any connections, roughing-in, etc., to the equipment, to make certain proper fit, space coordination, voltage and phase relationships are accomplished.
- F. In accord with the provisions specified hereinbefore, shop drawings, descriptive literature and schedules shall be submitted on each of the following indicated items as well as any equipment or systems deemed necessary by the Engineer:
 1. Raceways:
 - a. Conduit (each type).
 - b. Cable tray and each type of cable tray fitting.
 - c. Bridle ring assembly.
 - d. Junction, pull, and device boxes
 2. Systems: Each system submittal is to be complete with legible cutsheets for all devices, equipment, special wiring, etc. Also, provide scaled building layout drawings that indicate device placement, wiring, etc. Refer to the specific system's specification for additional submittal requirements where required.
 - a. Fire alarm system.
 3. Miscellaneous
 - a. Control panel assemblies.
 - b. Non-standard junction/pullboxes
- G. Specification Compliance Certification: Where this Section and other Sections of this Division require Specification Compliance Certification to be submitted, comply with the following:
 1. Prepare a line-by-line Specification Compliance Certification by marking up a copy of the Contract Document specification section in the left margin. Accompany the markup with a written report explaining all items that are not marked with "Compliance". Submit line-by-line markup, written report of deviations and alternates and a cover letter certified by Manufacturer or Installer that prepared the Specification Compliance Certification. Use the following key for preparing the line-by-line markup.
 - a. "C" for Compliance: By noting the term "compliance" or "C" in the margin, it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.

- b. "D" for Deviation: By noting the term "deviation" or "D" in the margin, it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified.
- c. "A" for Alternate: By noting the term "alternate" or "A" in the margin, it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner.
- d. "N/A" for Not Applicable: By noting the term "not applicable" or "N/A" in the margin, it shall be understood that the specified item is not applicable to the project.

1.02 SPECIAL WRENCHES, TOOLS AND KEYS

- A. Each Contractor shall provide, along with the equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed by him. Wrenches shall include necessary keys, handles and operators for valves, switches, etc. and keys to alarm pull boxes, panels, etc. At least two of any such special wrench, keys, etc. shall be turned over to the Architect prior to completion of the project. Obtain a receipt that this has been accomplished and forward a copy to the Engineer.

1.03 FIRE ALARM SHOP DRAWINGS

- A. The Contractor and equipment supplier shall submit to the Architect and/or Engineer, fire alarm system shop drawings complete with catalog cuts, descriptive literature and complete system wiring diagrams for their review prior to submittal to the Harris County or other authority having jurisdiction for their review.

1.04 MAINTENANCE AND OPERATION MANUALS

- A. Upon substantial completion of the project, the Electrical Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three complete copies of operation and maintenance instructions and parts lists for all equipment provided. These documents shall at least include:
 - 1. Detailed operating instructions.
 - 2. Detailed maintenance instructions including preventive maintenance schedules.
 - 3. Addresses and phone numbers indicating where parts may be purchased.
 - 4. Reference architectural specifications for additional requirements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 28 05 03

SECTION 28 05 10 - SCOPE OF THE ELECTRONIC SAFETY AND SECURITY WORK

PART 1 - GENERAL

1.01 SUMMARY

- A. Each Contractor's attention is directed to Section 28 00 00 – Common Electronic Safety and Security Requirements and all other Contract Documents as they apply to his work.

1.02 SCOPE

- A. The Electronic Safety and Security work for this project includes all labor, materials, equipment, devices, and related items required to completely install, test, place in service and deliver to the Owner complete safety and security systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not limited to the following:
 - 1. All j-hooks, fittings, etc.
 - 2. All wiring devices and device plates.
 - 3. All system hardware, equipment and installation.
 - 4. All programming, scheduling and testing.
- B. Grounding, per NEC and the specified requirements.
- C. All necessary fees and cost for permits, inspections, etc.
- D. Coordination with Division 21 for interface with fire suppression systems.
- E. Coordination with Division 23 for interface with HVAC systems and instrumentation and control system.
- F. Coordination with Division 26 for power, rough-in, conduit and pathways.
- G. Coordination with Division 27 for low voltage cabling.
- H. Fire alarm system as indicated.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 28 05 10

SECTION 28 13 00 - ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section identifies the requirements, technical design, and specifications for the access control system at the Fort Bend ISD Triplex Center Renovations, located in Sugarland, Texas ("Owner"). The access control system as specified is an Industry-Standard access control system shall be an extension of the District's existing system and includes (existing) access control server, (existing) access control software, control panels, card readers, credentials, cabling, power supplies, and any associated software, hardware, or licensing as specified.
- B. It is the Contractor's responsibility to review this specification and associated project specifications and drawings in their entirety, prior to bidding on the project. By bidding on this project, the contractor acknowledges that they have read and fully understand these specifications, with no exceptions. Contractor shall review the drawings, specifications, and existing conditions prior to bidding on the project. Any discrepancies shall be brought to the attention of the Architect / Design Consultant via request for information (RFI) in writing for evaluation and or clarification. If these items are not brought to the attention of the Architect / Design Consultant the more costly or difficult manner, and the better quality or greater quantity of work shall be provided by the contractor in accordance with the Architect's / Design Consultant's interpretation at no additional cost to the owner.
- C. Contractor shall furnish and install all materials, equipment, and labor necessary to provide a complete and functional turn-key access control system regardless of any items not listed or described in this specification or associated drawings.
- D. Requirement Sections Table of Contents
 - 1.3 Contractor Experience Requirements
 - 1.4 Submittal Requirements
 - 2.1 Products – General Requirements
 - 2.2 Acceptable Manufacturers
 - 3.1 Codes, Standards and Regulations
 - 3.2 Execution - General Requirements
 - 3.3 Coordination Requirements
 - 3.4 System Requirements
 - 3.5 Testing Requirements
 - 3.6 Training Requirements
 - 3.8 Substantial Completion
 - 3.9 Project Closeout Documentation

1.2 RELATED REQUIREMENTS

- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 28 and shall be complied with in every respect. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project.

1.3 CONTRACTOR EXPERIENCE REQUIREMENTS

- A. The Contractor shall be a certified DSX Access Control System Partner prior to submitting a bid for the work.

- B. The Contractor shall possess all relevant DSX Manufacturer Certifications (i.e., access control systems, hardware installation, software installation and programming) for both the company and individual technicians prior to submitting a bid for the work.
- C. The Contractor shall have a DSX manufacturer certified technician onsite throughout the duration of the installation phase of the project.
- D. The Contractor's Project Manager shall be dedicated to this project for the duration of the project and shall be available for all onsite coordination meetings.
- E. The Contractor shall have been in business for a minimum of five (5) years.
- F. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.
- The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
- Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.

1.4 SUBMITTAL REQUIREMENTS

A. Bid / Proposal Submittal

- 1. Contractor shall provide as part of their bid/proposal:
 - a. Breakdown of proposed parts and labor required for the completion of the project. Include documentation showing annual licensing cost of ownership.
 - b. Proposed construction schedule in a Gant chart format
 - c. Contractor Safety Plan detailing safety practices around the jobsite.
 - d. Contractor QA / QC process detailing processes and procedures to ensure quality workmanship during installation and troubleshooting.
 - e. A detailed description of the installation team(s) that would perform the work.
 - f. A resume for each of the key project personal.
 - Licensed in the State of Texas.
 - h. Contractor is responsible for procuring all applicable access control permits required for this project with Fort Bend County / Fire Marshall.
 - i. Submitting Contractor must be certified to install products and services for systems they are proposing. No subcontract of services will be allowed for any security scope of work. Contractor must submit to the Owner prior to starting any work the factory training certifications for all personnel that will be working on the system.

B. Pre-Installation Submittal

- 1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect / Design Consultant.
- 2. The Contractor is responsible for notifying and obtaining written approval via RFI from the Architect / Design Consultant / Owner of any proprietary devices, software, and/or installation processes.
- 3. Contractor is responsible for obtaining permitting as required in accordance with the authority having jurisdiction (AHJ), local, city, state, federal, and/or applicable law requirements.
- 4. Contractor shall ensure submittals are submitted in 15 business days of award to ensure all products can be ordered and received on site in order to not cause any delays. Any products having long lead times (more than 60 days) that may negatively impact the schedule shall be clearly identified in writing so the review and approval can be expedited.

5. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.
6. Contractor shall provide the following as part of their submittal:
 - a. Manufacturer product data sheets for each proposed system component.
 - 1 For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified will not be approved.
 - 2 Contractor shall identify any products that are discontinued, end of life, or near end of life, and shall propose equal alternate to the discontinued product in writing.
 - b. Manufacturer Product Certifications for Company.
 - c. Manufacturer Product Certifications for Installers.
 - d. Manufacturer Warranty letters.
 - e. Documentation indicating that Contractor has been in business for (5) years.
 - f. Address of Contractor's local office within a 75-mile radius of the project site.
 - Quantity of full-time, local technicians within a 75-mile radius of the project site.
 - h. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
 - i. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.
 - j. List of subcontractors performing any work on the project. List shall clearly identify the subcontractor's legal name and address, the scope of work to be performed by the subcontractors and the overall percentage of the project being provided by the subcontractor. If there are no subcontractors performing any work on the project, submit a statement on company letterhead clearly indicating no subcontractors will be performing any work on this project.
 - k. Manufacturer's certification letter confirming that the proposed access control system components do not have any known cybersecurity notices, bulletins, or alerts. If a vulnerability is discovered, the contractor shall notify the Architect / Design Consultant within 24 business hours. Provide the make and model of the associated equipment and the vulnerability.
 - l. Manufacturer cybersecurity hardening guide. If one is not available, provide documentation from the manufacturer stating such.
 - m. A complete set of shop drawings to include at minimum but are not limited to:
 - 1 Proposed and/or samples of original contractor security schedules. Schedules are not to be copy/paste of schedules provided within the contract documents. Schedules proposed shall be utilized as part of As-Built drawings with coordination with Div. 27 for additional information as required for network components.
 - a Device and equipment schedules shall include at a minimum but are not limited to:
 - (1) Device Label
 - (2) Device Type
 - (3) Device Power Requirements

- (4) Terminating MDF / IDF / Panel Location
- b Additional networking information as required to include:
 - (1) Rack
 - (2) Network switch
 - (3) IP addresses
 - (4) Patch panel
 - (5) Surge/lighting protection
 - (6) Power source
- 2 Elevation and Topography Drawings to illustrate the associated devices and equipment and the heights at which they will be installed.
- 3 Signal Flow Diagram including full security topology.
- n. Supplemental documents to include at a minimum but are not limited to:
 - 1 Contractor Safety Plan detailing steps Contractor will take to ensure a safe work environment.
 - 2 Contractor QA/QC Document to include bench testing / initial configuration of all critical system components including but not limited to:
 - a System Server(s)
 - b Cameras
 - c Contractor Furnished Workstations (if applicable)
 - 3 Construction Schedule in a Gant chart format
 - 4 Contractor Cybersecurity Hardening Guide detailing Contractor's internal policies for preventing the introduction of cyberthreats to the Owner's technology / security infrastructure.
 - a Contractor Certification Letter utilizing company letterhead detailing the company policies and procedures.
 - b Contractor shall provide a cybersecurity plan detailing their internal policy for preventing the introduction of cyberthreats to the Owner's technology / security infrastructure.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.
- B. All software, hardware, and equipment (from the date of RFP) shall be tested, currently available and commercially off the shelf product. (COTS).
- C. All wiring, equipment, and installation materials shall be Commercial Grade, new, and of the highest quality to meet or exceed the performance and features of the equipment and devices specified herein.
- D. Written approval must be obtained from the Architect / Design Consultant / Owner for any proprietary or custom software and/or equipment prior to the beginning of the project.
- E. All devices shall be installed with the manufacturer recommended mounts and accessories as necessary for the installation locations type as scheduled.
- F. Unless otherwise stated, all software and licensing shall be for the most current, up to date version of the system provided. For existing systems, Contractor shall obtain written verification of the Owner's most current

software version and notify via RFI the Architect / Design Consultant / Owner if implementation of the most current software / license version will require an upgrade to the Owner's existing system.

- Architect / Design Consultant / Owner will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- Proposed equivalent items must be approved in writing by the Architect / Design Consultant / Owner prior to purchase or installation. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.
- I. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall submit a formal RFI for an appropriate substitute.
- J. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished at no additional cost to the owner.
 - For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
 - Labels on all cabling, materials, and equipment must indicate a nationally recognized testing laboratory.
- M. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect / Design Consultant / Owner. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues and the Contractor will have all products on-site when needed to complete the job as per the project schedule.
- N. Any quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a fully functional turkey system. Where quantities are not noted, Contractor shall refer to drawings and schedules to determine exact quantities.

2.2 ACCEPTABLE MANUFACTURERS

- A. Access Control System Manufacturers
 - 1. DSX
- B. ACS Server
 - 1. WinDSX Access (Existing, Owner provided.)
- C. Access Control Software
 - 1. WinDSX Access (Existing, Owner provided.)
- D. ACS License
 - 1. Contractor to provide licensing as required.
- E. Client Workstation
 - 1. Owner Furnished, Owner Installed
- F. Badging Workstation
 - 1. Owner Furnished, Owner Installed
- Badging Printer
 - 1. Owner Furnished, Owner Installed
- Intelligent Controllers
 - 1. DSX-1042PKG (Master)
 - 2. DSX-1048PKG
 - 3. DSX-1042PKG

- I. Door Controllers
 - 1. DSX-1042
- J. Input Controller
 - 1. DSX-1044
- Output Controller
 - 1. DSX-1043
- Communication Module
 - 1. DSX-IP-HUB (Master)
 - 2. DSX-LAN (Master & Sub Panel)
- M. ACS Panel Power and Lock Supply
 - 1. DSX-1040PDP Power Distribution Panel with DSX-SP320-27
- N. ACS Power Supply Battery
 - 1. 12V 7AH Battery (2) per Power Supply
 - a. Yuasa
 - b. Or approved equal
- Card Reader
 - 1. Wall Mount
 - a. HID Proximity ThinLine II 5395 (Black)
 - 2. Mullion Mount
 - a. HID ProxPoint Plus 6005 (Black)
- P. Door Contact
 - 1. Recessed SPST
 - a. GRI 180-12
 - b. GRI 195-12 (DPDT)
 - c. Or approved equal
 - 2. Surface Mount with armored cable
 - a. GRI- 4402-A
 - b. GRI 4405-A (DPDT)
 - c. Or approved equal
- Request to Exit
 - 1. Unless otherwise noted, the request to exit shall be integral with the electrified door hardware. Reference Section 08710 - Finish Hardware.
 - a. Request to Exit – PIR Motion Sensor (used on Electric Strike access controlled doors)
 - 1 Bosch DS160
 - 2 Or approved equal
- Access Cards
 - 1. Contractor shall provide (100) access control cards. Coordination with Fort Bend ISD Design Manager is required for the exact type.

- S. Door Release, Duress, Panic and Lockdown Button
 - 1. Latching Hold-up Switch
 - a. HUSK20
 - 2. Door Release Button Momentary
 - a. HUB-2SA
 - 3. Lockdown Blue Mushroom Button - Wall Mount with Cover
 - a. STI SS2421LD-EN
 - b. Or approved equal
- T. Access Control System Cabling
 - 1. Lake Cable (Color Orange, Plenum Rated, Cable shall be sized based on length).
 - a. Card Reader – 22 AWG / 6-Conductor (Shielded)
 - b. Lock Power – 18 AWG / 4-Conductor
 - c. Request to Exit – 18 AWG / 4-Conductor
 - d. Door Contact – 22 AWG / 4-Conductor
 - e. Door Release Button - 18 AWG / 4-Conductor
 - f. Lock Down Button - 18 AWG / 4-Conductor.
 - Video Intercom Input / Output - 18 AWG / 4-Conductor.
 - h. RS-485 (Twisted, Shielded)
 - i. RS-232 (Twisted, Shielded)
 - j. Or approved equal
 - 2. Outside Plant Cables (Cable shall be sized based on length).
 - a. Card Reader – 18 AWG / 6-Conductor (Shielded)
 - b. Gate Controller - 18 AWG / 4-Conductor
 - c. Lock Power – 16 AWG / 2-Conductor (Minimum) Contractor shall size cable gauge per manufacturer's distance parameters.
 - d. Or approved equal
 - Video Intercom
 - 1. AiPhone – IX Series 2
 - a. Master Station (PoE)
 - 1 IX-MV
 - b. Video Door Station (PoE)
 - 1 Mullion Mount
 - a IX-DVM
 - c. Input/Output Network Adaptor (PoE)
 - 1 IXW-MA
 - 2. AiPhone Intercom System Cabling
 - a. By Division 27 10 00 Structured Cabling System
 - b. IP Intercoms – Category 6 Plenum rated - White Cable Jacket (By Others).

- . Pathway Cable Support
 1. Panduit J-Mod Cable Support System
 2. Erico – CADDY CAT LINKS J-Hook Series
 3. Panduit Plenum Rated Hook & Loop (Black)
- . Labeling
 1. Permanent Labels for Copper Cables
 - a. Panduit Self-Laminating Labels
 - b. Or approved equal.
- . Fire Stop
 1. STI Spec Seal
 2. 3M Products
 3. Or approved equal.

PART 3 - EXECUTION

3.1 CODES, STANDARDS, REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
 1. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire
 2. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 3. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
 4. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
 1. Telecommunications Distribution Methods Manual 13th Edition
 2. Outside Plant Design Reference Manual 5th Edition
 3. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
 4. NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 5. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Federal Communications Commission (FCC)
 1. FCC Part 15, Radiated Emissions Limits, revised 1998
 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 3. FCC Part 76, Cable Television Service, revised 1998
- F. Insulated Cable Engineers Association (ICEA)
 1. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable
 2. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors

3. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- . International Electrotechnical Commission (IEC)
- . Institute of Electrical and Electronics Engineers, Inc. (IEEE)
 1. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 2. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive
 3. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
 4. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code
 5. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
- I. International Organization for Standardization (ISO)
 1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
 2. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14443-3:2011 – Identification Cards
 4. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
- J. National Cable Television Association (NCTA)
- . National Electrical Contractors Association (NECA)
 1. NECA 1-2015 Good Workmanship in Electrical Construction
- . National Electrical Manufacturers Association (NEMA)
 1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
- M. National Fire Protection Association (NFPA)
 1. NFPA-70, National Electrical Code
 2. NFPA-75, Protection of Electronic Computer Data Processing Equipment.
 3. NFPA-101, Life Safety Code
 4. NFPA-297, Guide on Principles and Practices for Telecommunications Systems
 5. NFPA-780, Standard for the Installation of Lightning Protection Systems.
- N. National Institute Standards and Technology (NIST)
- . Occupational Safety and Health Administration (OSHA)
- P. Security Industry Association (SIA)
- . Telecommunications Industry Association (TIA)
 1. ANSI/TIA-568.0-D-1, Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA -568.0-D.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
 4. ANSI/TIA-568.3-D-1, Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure.

7. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
8. ANSI/TIA-758-B, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- . U.S. Department of Agriculture (USDA)
 1. RUS 1755 Telecommunications Standards and Specifications for Materials, Equipment and Construction
 2. RUS Bull 1751F-643 (2002) Underground Plant Design
 3. RUS Bull 1751F-815 (1979) Electrical Protection of Outside Plant
 4. RUS Bull 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)
 5. RUS Bull 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)
 6. RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)
 7. RUS Bull 345-72 (1985) Filled Splice Closures (PE-74)
 8. RUS Bull 345-83 (1979; Rev Oct 1982) Gas Tube Surge Arrestors (PE-80)
- S. Underwriters Laboratories, Inc. (UL)
 1. UL 294 Standard for Access Control System Units
 2. UL 294B Standard for Power Over Ethernet (PoE) Power Sources for Access Control Systems and Equipment
 3. UL 109 Standard Method for Flame Tests of Flame-Resistant Fabrics and Films
 4. UL 1076 Standard for Proprietary Burglar Alarm Units and Systems

3.2 EXECUTION - GENERAL REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of Texas, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect / Design Consultant for direction before proceeding with that part of the work.
- B. Contractor shall meet the specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines. Equipment and materials installed by the Contractor shall be free of defects and damage.
- D. No deviations from the plans, details or specifications shall be made without full consent in writing of the Architect / Design Consultant. The Contractor shall have written approval from the Architect / Design Consultant for any additional work beyond the Contract Documents prior to beginning such work.
- E. Prior to execution, Contractor shall verify no changes in software, licensing or hardware versions have occurred since the bidding of the project. In the event of any changes, Contractor shall verify system compatibilities with their proposed design, and notify via RFI the Architect / Design Consultant / Owner if the newest version(s) will require any upgrades / additional costs to the existing system(s).
- F. In the event site conditions do not allow the contractor to follow the execution requirements specified herein or in the provided details, the Contractor shall submit via RFI an alternative means and methods that is approved in writing by the Architect / Design Consultant.
- . The Contractor shall obtain written permission from the Architect / Design Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to: girders, beams, floors, walls, roofs, and/or ceilings.

- . If the Contractor does not obtain written approval from the Architect / Design Consultant prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- I. Contractor shall notify the Architect / Design Consultant a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect / Design Consultant to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- J. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
 - . Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
 - . Contractor shall test all cables prior to and post installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- M. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect / Design Consultant.
- N. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
 - . Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- P. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect / Design Consultant.
 - . All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
 - . All devices shall be installed flush, plumb, and (where required) centered on the wall, ceiling tile or structure for which it is being installed, unless otherwise noted.
- S. Devices installed in public spaces shall be mounted and secured using tamper-proof security fasteners unless otherwise noted.
- T. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
 - . Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
 - . Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
 - . The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.
 - . The manufacturer and contractor shall take positive measures to prevent the introduction of cybersecurity threats to the Owners technology infrastructure. These measures shall include but are not limited to:
 1. The contractor shall scan contractor owned equipment for cyber threats such as viruses, malware, ransomware, etc., prior to connecting the contractor owned devices to the Owners network.
 2. Ensure all technicians installing or configuring equipment are trained on the prevention of introduction of cyber threats to electronics, i.e., servers, and other associated equipment.
 3. All project documents shall be properly securely stored behind encryption and password protection to avoid unauthorized distribution of documents.
 - . Labeled Doors and Frames

1. In no instance shall any UL labeled door or frame be drilled, cut, penetrated, or modified in any way.
2. The Contractor shall be responsible for replacing any labeled door or frame that is modified without written approval from the Architect.

3.3 COORDINATION REQUIREMENTS

- A. The Contractor is responsible for the coordination of the following items and their respective disciplines included but not limited to.
- B. Coordinate with the Architect to ensure that:
 1. Adequate conduit is provided and that equipment backboxes are adequate for system installation.
 2. Adequate power has been provided and properly located for the security system equipment.
 3. Doors and door frames are properly prepared for electric locking hardware and door position switches.
 4. Access hatch locations (when required) shall be submitted in writing via RFI and coordinated with the Architect.
 5. Finishes and colors of all equipment visibly installed in public areas. Submit all finish and graphics for all equipment to the Architect for approval prior to installation.
- C. Coordinate with the Division 8 contractor for the following:
 1. Door hardware manufacturer installation and power requirements.
 2. Installation, power, and requirements for integral request to exit switches.
- D. Contractor is responsible for coordinating with gate controller installers for controller locations and interfacing terminations.
- E. Coordinate with the Division 26 contractor for the following:
 1. Power requirements, conduit sizes/pathways, sleeves, back boxes, grounding, and bonding requirements of security devices in the following locations:
 - a. Interior of the building
 - b. Exterior of the building
 - c. Pole, pedestals, canopies, awnings, building architectural surface, etc.
 - d. Special conditions (clean room, hazardous areas, roof top mounted devices, etc).
 2. Coordinate location and termination of earth ground for all device specified herein as required per manufacturer installation requirements.
- F. Coordinate with the Division 27 contractor for the following:
 1. Installation and power requirements of network infrastructure associated to the specified system
 2. Associated patch cable lengths and quantities required for the specified system.
 3. Location, power, and backup requirements for rack mount equipment.
- Coordinate with the Division 28 (Fire) contractor for the following:
 1. Door hardware manufacturer installation and power requirements associated with fire alarm system(s).
 2. Door hardware manufacturer installation and power requirements for all ACS electric locking mechanisms with time-delay ("delayed egress") functions as defined by NFPA 101.
- The Contractor is responsible for coordinating ACS locations and mounting preferences of all specified security devices with the Architect / Design Consultant prior to installation.
- I. The Contractor is responsible for coordinating all ACS programming requirements with the Owner / Architect / Design Consultant.

- J. The Contractor shall coordinate with the Owner for the following:
1. Network IP addressing for networked system equipment, controllers, and devices
 2. Device labeling scheme
 3. Firmware/software updates
 4. Client workstations requirements and locations
 5. Location of rack mount equipment.
 6. Locations, type, programming, configuration, and Owner's final expectations for any Contractor Furnished Contractor Installed (CFCI) equipment and devices.
 7. Uninterruptible Power Supply (UPS) requirements.
 8. Painting of exposed, publicly visible conduit pathways
 9. Credential reader card formats, LED, buzzer and associated visual/audio functionalities.
 10. When required, credential card ordering, formats, facility codes, barcode and template requirements or standards prior to install. Coordinate timelines for delivery and distribution of the credentials to the Owner prior to procurement.

3.4 SYSTEM REQUIREMENTS

A. General

1. The Access Control System (ACS) shall consist of server(s), software, licensing, workstations, doors controllers, access control cabling, credentials and all other peripheral components as indicated on the drawing and specified herein.
2. Any devices associated with the installation shall have the latest firmware updates downloads via owner approved secure link from the system software and/or remotely from the manufacturer.
3. All Access Control software, equipment and system requirements shall be installed per their respective Manufacturer Installation Guidelines.
4. Programming and data entry to be provide by the Contractor. Contractor shall program the Access Control System to provide the following basic functions included but not limited to:
 - a. Database Importing (Active Directory, CSV file, etc.)
 - b. Graphics Maps
 - c. Time zones
 - d. System Reports
 - e. Threat / Emergency Management Protocols (Lockdown, Severe Weather, etc.)
 - f. Role Based User System Access (Admin, User Privileges, etc.)
 - Access levels (Areas, Floor Groups, User Groups, etc.)
 - h. Schedules (Lock/Unlock, Auto Arm/Disarm, etc.)
 - i. Auxiliary I/O Devices (Sirens, Strobes, Buzzers etc.)
 - j. Door Configuration Settings to include but not limited to:
 - 1□ Anti-Pass Back
 - 2□ Door Release via Push Button Input
 - 3□ Door Release via Request to Exit (Maglock ONLY)
 - 4□ Door Forced / Door Held Alarms Conditions
 - 5□ ADA Door Settings

- k. Special Conditions (Fire Alarm Relays, Hold Opens, Elevators, Gate / Door Operators, etc.)
 5. When programming and data entry for the system is to be completed by Owner, Contractor is responsible for initial programming to ensure the installed field devices, media converters, etc., are communicating to the head-end equipment, so that the Owner can complete the necessary programming and shall assist in troubleshooting in the event they do not.
- B. Access Control System (ACS) Software
1. Application / Client Workstation Software
 - a. The ACS software shall be installed as the most current version; contractor shall coordinate with owner prior to the upgrade/install to identify and evaluate any software conflicts. Conflicts shall be brought to the attention of the design team prior to bidding via Request for Information (RFI). Contractor shall coordinate the install and configure software on workstation(s) as required to provide a full turnkey ACS system.
- C. Access Control System Licensing
1. Contractor shall be responsible for providing and applying all necessary licensing key(s) for the specified system(s) as required by the manufacturer(s) for a fully functioning access control system.
 2. Contractor shall maintain a secured document with all license key(s) information applicable to this project. All license key(s) are property of the owner and shall be kept secured at all times and then surrendered to the Owner at the end of the project.
- D. Access Control System Hardware
1. ACS Server
 - a. Existing
 2. Communications
 - a. Communication between servers, and workstations, networked based controllers/sub-controllers will communicate using the Owner provided data network unless otherwise noted. Coordinate with owner for network configuration requirements.
 - b. The ACS shall also support end to end 128-bit encryption unless otherwise noted.
 - c. Alternative communications means and methods shall be provided by Division 28 where applicable.
- E. Access Control Workstations
1. Operator/Client Workstation
 - a. OFOI
 2. ID Badge Printing Workstation
 - a. OFOI
 3. Access Control System Controller(s)
 - a. Install Controller(s) in designated MDF / IDF / Mechanical room(s) as indicated on drawings
 - 1 The Controller(s) shall be wall mounted in the ACS manufacturer's UL listed enclosure, unless a separate manufacturer enclosed power supply solution is specified that is specifically designed for the controller board(s) specified herein. The enclosure shall consist of the following
 - a Single cover, hinged, with identical key cylinder lock(s) for all enclosure(s). Hinged double doors will not be accepted.
 - b Contractor shall furnish, install, and connect tamper switch for all enclosure(s) to the controller(s) as specified. One alarm input is needed per MDF/IDF/Mechanical to alarm via the ACS system when the enclosure is opened.

- Contractor shall furnish, install, and connect Battery Fail/Power Loss alarm inputs to the controller(s) as specified. One alarm input is needed per MDF/IDF/Mechanical to alarm via the ACS system in the event of low battery/power loss conditions.
 - Enclosure(s) shall be mounted flush, plumb, and properly secured on fire-rated plywood using appropriate mounting hardware. Pathways to or from the enclosure(s) shall mechanically protected in a conduit or gutter system. Exposed cabling is not permitted.
 - b. Device power shall be provided from a UL listed power supply or PoE powered network switch where required in accordance with the manufacturer's requirements.
 - c. Controller(s) shall be installed per the construction documents.
 - d. Controller(s) shall be installed and configured in accordance with the most current manufacturer installation instructions.
 - e. The installation shall be performed or directly supervised by a manufacturer-certified technician.
 - The term "supervised" means the certified technician shall be on-site and supervising the installation.
 - The certified (on-site) technician shall have a copy of the manufacturer certification on-site readily available for review.
 - The manufacturer certification shall be current and valid.
- F. Access Control System Card Readers
 - 1. Provide card reader(s) as indicated on the drawings.
 - 2. Readers shall be securely mounted flush and plumb on the wall/mullion per the manufacturer installation guidelines.
 - 3. Exterior card readers shall be installed with a weather-proof gasket as recommended by the manufacturer.
 - 4. Exterior card readers mounted on gates or vehicle pedestals shall be securely mounted in a NEMA rated weather-proof enclosure.
 - 5. Where a weather-proof gasket is not sufficient for weather-proof protection, a polyurethane sealant for exterior use shall be applied.
 - 6. Readers shall be installed with the manufacturer provided tamper-proof security fasteners, unless otherwise approved in writing by Architect / Design Consultant. If tamper-proof security fasteners are not provided, the contractor is responsible for procuring the requested hardware at no cost to the owner.
- Access Control System Credentials (Cards, Vehicle Tags, PIN, Biometric)
 - 1. All credential cards shall be surrendered to the owner in their original packaging after procurement.
 - 2. Template / Card Format / PIN numbers
 - a. Security Contractor shall coordinate PIN number assignment with the Owner prior to any programming.
 - b. Security Contractor shall maintain a digital record of all Template / Card Format / PIN numbers to be secured at all times, and then provide to Owner at Project Close-Out.
 - 3. Unless otherwise directed, the contractor is responsible for the mounting of vehicle tags. Contractor shall confirm with the Owner the placement of interior / exterior vehicle tags in writing.
- Door Position Sensors (Door Contacts, Tamper Switches)

1. Provide magnetic concealed door position switches, surface mount door position switches and overhead door position switches to monitor the open/closed status of doors as specified herein and as indicated on the drawings.
 2. The contractor shall ensure the circuit of the door position sensor shall match the physical status of the door opening i.e., Normally Closed when the door is closed.
 3. Exterior mounted door position sensors shall terminate using the appropriate outdoor-rated weatherproof connections and fasteners based on site conditions.
 4. Provide flexible metallic conduit (as required) from the sensor location to the associated junction box as indicated on the drawings. Conduit shall be securely fastened to the structure using proper fasteners based on site conditions.
 5. Contractor must ensure adequate spacing between contact and magnets to avoid abrasion / damage to the device.
 6. Install end of line resistors for line supervision. Refer to manufacturer for recommended resistance values
 7. Tamper shall be mounted inside the enclosure on key switch side.
- I. Request-to-Exit
1. For doors equipped with electric locking mechanical that are free exiting at all times (i.e., mortise electric locks, electric strikes, etc.), the REX motion sensor shall only shunt the door position sensor from the Access Control System unless otherwise noted.
 - a. Integrated in Electrified Door Hardware
 - 1 Security Contractor shall route cable from door controller to access controlled door as indicated on the drawings and terminate the specified cable to the top of the Division 8 installed Electrified Power Transfer Hinge.
 - a At the time of installation of the door hardware, The Security Contractor shall provide and install all end of line resistors required by the PACS System Manufacturer.
 - b Security Contractor shall not remove Division 8 Installed Door Hardware unless otherwise approved in writing by the Architect / Design Consultant.
 - b. Request-to-Exit Motion Sensor
 - 1 Motion sensor shall be mounted flush, plumb, and properly secured on a single gang box or mechanical brace using appropriate mounting hardware and trim plate.
 - 2 Motion sensors shall be positioned close to the door opening and angled to prevent tampering from forced entry. Contractor shall ensure devices mounted in the ceiling space are not obstructed or impacted when servicing in relation to other ceiling mounted devices (Exit signs, smoke detectors, lighting fixtures, etc.)
- J. Door Release / Lockdown
1. Security device cabling installed in the knee space shall be mechanically protected with an armored flex from the rough-in back box to the edge device as scheduled. No exposed cabling is permitted.
 - a. Door Release / Lockdown shall be wired to the Access Control System input boards as scheduled.
 - 1 The Door Release / Lockdown button shall be mounted flush, plumb, and properly secured as scheduled.
 - a The Door Release button shall be configured as momentary.
 - b. Duress buttons shall be installed under desk at the reception area and the Principal's desk.
 - 1 Duress button shall alert Fort Bend ISD Police Department.

- 2□ Provide desk-mounted or wall mounted personnel duress alarms with normally closed alarm output contacts as indicated on the drawings.
- c. Lock down button shall be located by the fire alarm panel inside the Administration area.
 - 1□ Lockdown shall be wired to the Access Control System input boards as scheduled.
 - 2□ Duress / Lockdown button shall be mounted flush, plumb, and properly secured as scheduled.
 - 3□ The Lockdown button shall be configured as latching.
 - a□ Security Contractor shall configure lockdown button when pressed to close and lock Classroom pod/wing in order to secure each pod/wing independently in the case of a lockdown.
 - b□ will be the responsibility of the Security Contractor to coordinate with the Fire Alarm Contractor to configure/program all the doors at Classroom pod/wing with magnetic hold open configuration should allow for the ability to secure each pod/wing independently in the case of a lockdown. This can be accomplished with doors that separate these areas and that are tied to the lockdown system.
- . Access Control Intercom Systems
 - 1. Unless otherwise stated, all intercom configurations shall be Contractor Programmed.
 - 2. Intercom shall be configured to dial to the associated handset unless otherwise stated.
 - 3. Door Release via the PACS shall be initiated through programming and relay cabling from the intercom / intercom master station to the associated door relay board.
 - 4. Coordinate audio recording requirements from intercom systems
- . Electrified Door Hardware Mechanical Connections (Division 8)
 - 1. Contractor shall conceal security cabling in door frame, door channels, walls wherever possible. Submit RFI if site conditions do not allow and propose alternative methods of terminations.
 - 2. The Division 28 Contractor shall not make any modifications to fire rated doors without obtaining written permission from the Architect.
 - 3. The Division 28 Contractor is responsible for providing the following:
 - a. Provide relay signal cabling only from the ACS to the Division 8 power supply or relay board(s) located either at the door or centralized location
 - b. Termination of Lock Relay Power for PoE based networked door controllers up to the electrified door hardware
 - c. Device power provided by Owner-provided PoE networked switch.
 - 4. The Division 8 Contractor is responsible for providing the following:
 - a. Final terminations of all internal wiring of electrified door hardware and door power supply connections.
 - b. Final terminations from the door power supply or relay board up the power transfer hinge or similar connection point of the electrified door hardware.
- M. Access Control System Power Supplies
 - 1. Unless otherwise noted, all power supplies shall be hardwired to the 120VAC circuit. No pigtails / plugs shall be acceptable.
 - 2. Enclosed Wall Mounted Access Control Panel Power Supply
 - a. The Security Contractor shall provide and install devices as indicated on the drawings.

- b. Security Contractor shall refer to Division 8 Finish Hardware schedules and system requirements for sizing and quantity of boards in the enclosed power supply.
 - c. The Security contractor shall provide dual voltage power supply board as specified.
 - d. The Security Contractor shall provide and install Power Control Modules as specified.
 - 1 Each Lock power output cable shall be terminated to a dedicated port on the Power Distribution Module specified.
 - e. The Security Contractor shall provide and install Power Distribution Modules as specified.
 - 1 Each request-to-exit motion (where required) cable shall be terminated on a dedicated port on the Power Distribution Module.
 - f. The Security Contractor shall size each enclosure(s) with dual voltage power supplies as specified to include an additional total amperage of at least for 20% additional maximum amperage output per enclosure for future expansion as required.
 - The Security contractor shall provide (2) back up batteries as specified per each enclosure.
 - h. 115VAC hardwired power shall be provided and installed by Division 26 Electrical Contractor.
 - i. 30Amp dedicated circuit shall be provided and installed by the Division 26 Electrical Contractor.
 - j. Provide U.L. Listed power supplies for all Access Control System panels as specified.
 - k. Provide battery chargers and batteries for all power.
 - l. Monitor low battery and power fail alarms for each power supply.
 - m. Tamper shall be wired as recommended by the manufacturer.
3. Backup Battery(s)
- a. The Security Contractor shall provide and install (2) batteries per power supply enclosure.
 - b. The Security Contractor shall label the install date for each battery with printed labels.
- N. Access Control Cabling
- 1. Pathways
 - a. Wires shall be routed utilizing the pathways as indicated in the technology drawings. Reference Division 27 specifications for additional requirements.
 - b. Access control cabling shall be routed separate from the network data communication cables specified in Division 27. Contractor shall provide separate pathways and j-hooks for the cables specified herein.
 - 2. Wiring Techniques
 - a. All cables shall be pre-tested for shorts prior to final device terminations after cables are installed.
 - b. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored in the provided enclosure(s) as detailed in the drawings. If an enclosure is not provided for the specified devices herein, the service loop shall be installed on a j-hook in the nearest accessible ceiling space closest to the device.
 - c. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored at the access control panel.
 - d. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored on the wall above the ladder rack in the regional MDF / IDF / Mechanical room(s).
 - e. Install code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where the penetrations are made by or used for installation of the ACS.

- f. All wire and cable shall be continuous from device location to the final point of termination ("Home Run"). No mid-run cable splices shall be allowed.
 - Wire and cable within control panels, power distribution cabinets and other security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to the equipment within the enclosure. All wire and cable shall be bundled and tied. Velcro cable ties shall be utilized.
 - h. Neatly bundle and wrap all horizontal / vertical runs (above accessible ceilings and not within conduit) wire and cable at intervals as code requires. Provide supports as required. All supports shall be UL listed for the application.
 - i. All system wiring within vertical riser shafts (as required) shall be bundled, wrapped, and tied to the structure at one-meter intervals in order to isolate it from other wire and cable within the shaft. Additionally, all wire and cable within the shaft shall be supported at least every two floors using manufacturer approved vertical management hardware and installation methods. Provide all personnel and equipment necessary to install and support the cable. All equipment shall be UL listed for the application.
 - j. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on wire and cable.
3. Splices / Transitions
- a. Home run cabling is the preferred method of installation for all Access Control System devices and panels.
 - b. In the unlikely event that a splice or transition is required, the Contractor shall identify all splices / transition points required for the completion of the project and confirm, in writing, in advance, via RFI with the Architect / Design Consultant for acceptance of the proposed wiring techniques to be utilized.
 - c. By not submitting an RFI, Contractor acknowledges that no major splicing is required for the completion of this project. Any splices not previously identified that are found to be faulty shall require the Contractor to re-install the affected cable in its entirety at no cost to the Owner.
 - d. Contractor shall clearly mark splices / transition points on the shop drawings and As-Built drawings as part of the project close-out.
4. Cable Dressing
- a. No excessive cable slack shall be left in enclosures.
 - b. Cables shall be dressed in a professional manor
 - c. Cables shall be routed in 90-degree angles to termination points inside enclosures.
 - d. Ty raps / zip ties are not permitted, hook and loop / Velcro is acceptable.
 - e. Exposed wires are not acceptable
 - f. Enclosures and equipment / Telecommunication room shall be left clean without debris including but not limited to: labels, connectors, screws, etc.
 - All spare / unused cables shall be in the enclosure shall be neatly coiled and protected to avoid any shorts to ground.
- Device Labeling
- 1. Unless otherwise, all installed devices shall be labeled. Contractor shall verify device numbering scheme and Owner's current naming convention standard in writing in advance via RFI prior to generating any labels.
 - 2. All labels shall be machine printed and adhered to the device in a location that is visible and legible to the naked eye.

3. All labeling in the field shall match the same labeling scheme in the closeout documents.
 4. Refer to Div. 27 specifications for data network device cabling requirements.
 5. Cables overall sheath shall be labeled within (6) inches from the point the cable enters/exits the enclosure inside the Equipment Room / Telecommunications / Security Control Location Rooms.
 6. Cables shall be labeled within (1) inch from the termination point inside the Equipment Room / Telecommunications / Security Control Location Rooms.
 7. Cables shall be labeled within (1) inch from the termination point at the device end.
 8. Cables shall be labeled identically at both ends.
- P. Fire Stop / Smoke / Sound Sealants
1. Use proper sealant as recommended by the manufacturer for the specific application in compliance with per all applicable codes: City, State, Federal, LAHJ.
 2. All existing pathways shall be resealed in compliance with per all applicable codes: City, State, Federal, LAHJ.
- . Grounding and Bonding
1. All grounding and bonding shall be performed by a licensed electrical contractor to ensure the electrical integrity of the low voltage system and devices specified herein per federal / state / local codes and standards.
 2. Contractor shall notify the Architect / Owner / Design Consultant via written RFI of any site conditions or installations that will require additional coordination.
 3. Contractor shall ensure proper grounding of shielded or non-shielded cabling and devices conform to the specified devices manufacturer's installation guidelines.
 4. The Division 28 Contractor is responsible for coordinating with the Division 26 Contractor for grounding and bonding security devices per applicable codes and standards.
- . Conduit, Boxes and Raceways (For Reference Only - By Division 26)
1. Install all conduit necessary for a complete installation, but not provided for in the Security Drawings, in finished areas concealed in chases, furring's, concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.
 2. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, industry-standard installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets, or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.
 3. All conduits shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.
 4. All required inserts shall be drilled-in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.
 5. Swab out and remove all burrs from conduit before any wires are pulled.
 6. Lay out and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the covering of the pipe crossed.
 7. Provide fire stops where conduits penetrate fire rated walls and/or floors.
 8. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Architect.

- S. Access Control System Programming And Data Entry
 - 1. Provide all initial system programming and setup of the ACS including, but not limited to the following:
 - a. The Contractor will be provided access to the OFOI server for "general" programming. The Contractor shall provide for the following "general" programming of the access control system. Fort Bend ISD will then complete the detailed programming.
 - 1 Naming of all doors
 - 2 General access level at all doors
 - 3 General access level is all doors are locked 24/7/365.
- T. High Voltage (120VAC) Power Requirements (For Reference Only – by Division 26)
 - 1. 120VAC AC power dedicated to security shall be provided by the electrical contractor for the Access control system as indicated on drawings. Coordinate with the Architect to establish locations of security dedicated 120VAC AC circuits.
 - 2. Connect to the AC power (provided by electrical contractor) and provide UL listed power supplies and transformers to distribute low voltage power to the system components as required.
 - 3. Provide all conduit and wiring from the AC power facilities to the Access Control / Power Supply Enclosures.
 - 4. Provide Mechanical separation to isolate 120VAC wires from other low voltage cabling. Low voltage cabling shall not route over/under/parallel to 120VAC wires.
- Surge Protection / Lightning Arrestors
 - 1. Protect all exterior devices, control, power, signal cables and conductors that are power surges. Each surge protector shall be UL Listed.
 - 2. Unless otherwise noted, surge protection devices shall be installed at both the edge and head end of the cabling run.
 - 3. Surge devices shall be installed as close as accessibly possible to the equipment they are protecting.
 - 4. Surge Protection shall be properly installed in an accessible ceiling or enclosure space to allow for cable removal during troubleshooting.
 - 5. Include surge protection device locations on as-builts and shop drawings.
 - 6. Provide protection against spikes, surges, noise, and other line problems for all system equipment and components.
 - 7. Properly ground surge protection devices per the manufacturer installation requirements.

3.5 TESTING REQUIREMENTS

- A. As a prerequisite, the Contractor shall perform a burn-in of the system that is in accordance with the manufacturer's installation guidelines.
 - 1. All devices shall be powered up and tested in a phased approach in a controlled testing environment on or off premise (to be coordinated with the Owner).
 - 2. Update firmware with most up to date version (to be coordinated with the Owner).
- B. Each system hardware device shall remain operational during the burn-in test for a minimum of eight (8) hours without failure.
 - 1. Contractor shall provide successful burn-in results in writing to the Architect / Design Consultant prior to final acceptance.
- C. Security Contractor shall conduct a complete QA/QC test of the entire system and provide a written report of the test results (Punchlist). The tests shall include, but not limited to:
 - 1. Hardware

2. Software
 3. Network Connectivity
 4. Device Power
 5. Configure system device settings
- D. Identify and remediate any issues and/or system faults
- E. It is the responsibility of the Contractor to verify that all devices, equipment, software, interfaces, sub-system interfaces and integrations are fully functional and operational.
- F. Contractor shall rectify all issues discovered during the QA/QC process and shall document these corrections via a Contractor provided punch-list.
1. At a minimum, the punch-list shall contain:
 - a. Date of the item identified
 - b. Description of the discrepancy with photographs, as necessary.
 - c. Date the item was rectified
- . All QA/QC items shall be corrected, and an electronic report surrendered to the Architect / Design Consultant prior to calling for Substantial Completion.

3.6 TRAINING REQUIREMENTS

- A. Provide for (4) hours of training for two (2) persons on each system.
- B. Provide a test report showing the system has been 100% tested and 100% operational prior to training / demonstration.
- C. Coordinate with the Owner to establish a training outline and schedule. Submit a comprehensive training curriculum to the Owner once all preliminary coordination is complete. The Owner will revise and comment on the curriculum as required.
- D. Contractor training shall be conducted onsite/virtually with a manufacturer's representative in attendance.
- E. Operator training shall include, but not be limited to the following:
1. All operating procedures and graphic user interface (GUI)
 2. System configuration
 3. Alarm acknowledgement, alarm response logging, and map graphics functionality
 4. Image capture, badge printing, and print ribbon replacement.
- F. Administrative training shall include, but not be limited to the following:
1. All operating system procedures, configuration variables and graphic user interface (GUI)
 2. Database functions and setup
 3. Cardholder input and deletion procedures
 4. Report generation
 5. Card format configuration
 6. Badge creation and design
- . Record, label, and catalog all training on DVD and "user's manual" written specifically for the Owner personnel onsite, for daily routine operations of the systems. Provide the DVD and user's manual to the Owner for future in-house training sessions and / or reviews. Furnish all temporary equipment necessary for recording all training sessions. Maintain accurate and up-to-date time sheets of all training sessions.

- . The Owner reserves the right to use any excess training hours, not used by the time of system completion, for future training as requested until the total number of training hours has been completed.

3.7 FIELD OBSERVATIONS

- A. A minimum of ten business days in advance, Contractor shall notify the Design Consultant and Owner as to the readiness for a Field Observation for the following at a minimum but not limited to:
 - 1. Rough-In Observation – after conduits have been installed, but before walls have been installed.
 - 2. Above Ceiling Observation – after cabling has been installed, but before ceilings have been installed.
 - 3. Final Site Observation – a minimum of two weeks before Substantial Completion.
- B. During Design Consultant's Final Site Observation of the installed systems, provide a minimum of one factory-trained/certified technician on the operation of all installed systems for up to (1) 8-hour day to assist with Design Consultant's functional testing.
- C. Non-Conforming Work (Punch-List)
 - 1. After receipt of written notice of deficiencies (Punch-List), Contractor shall correct all defective work within ten business days. If the work has been identified to be corrected by the Architect/Design Consultant, the Contractor shall remediate it in conformance with the contract documents at no cost to the Owner.

3.8 SUBSTANTIAL COMPLETION

- A. It is the responsibility of the Contractor to ensure that all punch list items are 100% complete. The Contractor shall complete an internal Quality Assurance / Quality Control inspection, make all corrections, document the deficiencies and corrections prior to requesting for any further inspections with the Architect / Owner / Design Consultant.
 - B. Prior to any Substantial Completion, the Contractor shall submit a minimum two sets of preliminary (first draft) Record Drawings (As-Builts) to the Architect/Design Consultant. The preliminary Record Drawings are to be used by the Architect/Design Consultant to conduct the system substantial completion inspection.
 - C. The Contractor shall notify the General Contractor / Architect / Design Consultant that all the items noted above have been completed and the installation is ready for inspection.
 - D. The Architect / Design Consultant shall schedule an inspection of the installation with the General Contractor and the Installing Contractor(s) present.
 - E. The Substantial Completion Inspection shall consist of the following:
 - 1. The Project Manager/Superintendent and Installation Technician shall be on site with all tools, materials, and equipment ready to resolve any minor issues identified.
 - 2. The Design Consultant or designated representative shall visually inspect the installation in accordance with the official design documents.
 - a. The Contractor shall be prepared to remove and reinstall (minimum 10%) randomly selected security devices to inspect the mounting, cabling, terminations, connectors, labeling, tampers.
 - 3. Punch list items shall be identified and documented in a provided punch list with a date and description of the issue found, and a date the discrepancy was addressed and the resolution.
 - F. Provide all personnel, equipment, and supplies necessary to perform all site testing. All video surveillance cameras shall be pointed and aimed in the views as shown in the drawings and using best practices. Contractor shall provide a minimum two employees to verify all cameras have been pointed and aimed to achieve Owner final approval. A manufacturer's representative may be present on site to answer any questions that may be beyond the technical capability of the Contractor's employees, if the Contractor so elects or by specific request of the Architect or Owner, at no charge to the Architect or Owner.
- . The Contractor shall coordinate with the Architect/Design Consultant on security related construction clean-up and patch work requirements. Security equipment closets and similar areas should be free of accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the

Work, remove all waste materials, rubbish, the Contractor's and its subcontractors' tools, construction equipment, machinery, and all surplus materials.

- . At their discretion, if the Design Consultant or their designated representative deems the site not ready for inspection/observation, the inspection will be cancelled. The Contractor(s) shall immediately address all issues identified, and shall reschedule the inspection in a timely manner so as not to affect the overall construction schedule.
- I. Adjustments and Documentation: energizing and testing the systems, make adjustments and document the setting of controls, configurations, as applicable. Tabulate all data along with an inventory of test equipment, a description of testing conditions and a list of test personnel.
- J. Test Documentation: Create and provide complete test reports documenting the results of the each performed on each device, control panel, power supply, and other elements of the system. Copies of preliminary test data shall accompany copies of performance testing data as part of the Operating and Maintenance submittal.

3.9 PROJECT CLOSEOUT DOCUMENTATION

A. As-Built Drawings

1. Drawings shall be provided to the Architect / Owner / Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect / Owner / Design Consultant.
2. Unless otherwise requested, Contractor shall provide digital copies of close-out documents, and deliver to the Architect / Owner / Design Consultant electronically.
3. As-Built drawings shall be produced in AutoCAD/Revit in the most current or compatible version and provided electronically in .dwg and/or .pdf format.
4. Drawings shall be provided in the original size as issued by the Architect / Design Consultant.
5. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect / Design Consultant.
6. Provide a conformed set of Drawings as related to the project, depicting the condition of the access control system as installed to include but not limited to:
 - a. ASI, PR, and Addendum items installed throughout the duration of the project.
7. Provide a hard copy of the conformed set of drawings to be physically stored at the end of the project in a designated Access Control System enclosure. Coordinate with Owner for final storage location.
8. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of the following not limited to:
 - a. Access Control System Riser / Signal Flow Diagrams
 - b. Access Control System Backboard Layouts
 - 1 □ To include access control boards, power supplies, pathways, etc.
 - c. Sleeves, Backbone Cabling and Communication pathways
 - d. Access Control System device locations and labeling scheme.

B. Operation & Maintenance Manuals

1. Unless otherwise noted, provide O&M manuals electronically to Owner to include all drawings, product datasheets, hardware manuals as related to the project.
2. Coordinate with the Owner for provisioning of physical storage devices (Hardcopy, Flash Drive, CD/DVDs)

C. Manufacturer's Product Warranty

1. Certificate of product warranty shall be provided to the Architect / Owner / Design Consultant at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Architect / Design Consultant.
 2. The manufacturer of the solution shall furnish a product warranty as per the specifications starting at final system acceptance.
 3. One original and two copies of the Manufacturer's product warranty shall be provided.
- D. Contactor's Statement of Warranty
1. Statement of warranty shall be provided to the Architect / Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect / Design Consultant.
 2. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor and workmanship starting at final system acceptance.
 3. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.

END OF SECTION 28 13 00

SECTION 281600 - INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section identifies the requirements, technical design, and specifications for the intrusion detection system at the Fort Bend ISD Triplex Center Renovations, located in Sugarland, Texas ("Owner"). The intrusion detection system as specified is an industry standard shall be an extension of the district's existing system and includes keypads, motion detectors, door contacts, control panels, power supplies and intrusion detection cabling as specified.
- B. It is the Contractor's responsibility to review this specification and associated project specifications and drawings in their entirety, prior to bidding on the project. By bidding on this project, the contractor acknowledges that they have read and fully understand these specifications, with no exceptions. Contractor shall review the drawings, specifications, and existing conditions prior to bidding on the project. Any discrepancies shall be brought to the attention of the Architect or Design Consultant via request for information (RFI) in writing for evaluation and/or clarification. If these items are not brought to the attention of the Architect or Design Consultant the more costly or difficult manner, and the better quality or greater quantity of work shall be provided by the contractor in accordance with the Architect's or Design Consultant's interpretation at no additional cost to the owner.
- C. Contractor shall furnish and install all materials, equipment, and labor necessary to provide a complete and functional turnkey intrusion detection system regardless of any items not listed or described in this specification or associated drawings.

1.2 RELATED SECTIONS

- A. Section 26 00 00 – Electrical
- B. Section 26 09 00 – Fire Alarm Controls
- C. Section 27 10 00 – Structured Cabling System
- D. Section 28 13 00 – Access Control System

1.3 RELATED ITEMS INDEX

- A. Contractor Experience Requirements
- B. Submittal Requirements
- C. Products – General Requirements
- D. Acceptable Manufacturers
- E. Codes, Standards and Regulations
- F. General Requirements
- G. Coordination Requirements
- H. System Requirements
- I. Testing Requirements
- J. Training Requirements
- K. Project Closeout Documentation

1.4 CONTRACTOR EXPERIENCE REQUIREMENTS

- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 28 and shall be complied with in every respect. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project.
- B. Contractor Experience Requirements
 1. The Contractor shall be a certified Honeywell Vista Preferred Partner prior to submitting a bid for the work.

2. The Contractor shall possess all relevant Manufacturer Certifications (i.e., intrusion detection systems, hardware installation, software installation and programming) for both the company and individual technicians prior to submitting a bid for the work.
 3. The Contractor shall have a manufacturer certified technician onsite throughout the duration of the installation phase of the project.
 4. The Contractor's Project Manager shall be dedicated to this project for the duration of the project and shall be available for all onsite coordination meetings.
 5. The Contractor shall have been in business for a minimum of five (5) years.
 6. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.
 7. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
 8. Licensed in the State of Texas.
 9. Contractor is responsible for procuring all applicable intrusion detection permits required for this project with Fort Bend County Fire Marshal.
- C. Submitting Contractor must be certified to install products and services for systems they are proposing. No subcontract of services will be allowed for any security scope of work. Contractor must submit to the Owner prior to starting any work the factory training certifications for all personnel that will be working on the system.

1.5 SUBMITTALS/REQUIREMENTS

A. Bid Proposal Submittal

1. Contractor shall provide as part of their bid proposal:
 - a. Breakdown of proposed parts and labor required for the completion of the project.
 - b. Proposed construction schedule in a Gantt chart format
 - c. Detailed Safety Plan
 - d. Detailed documentation of A & C
 - e. A detailed description of the installation teams that would perform the work.
 - f. A resume for each of the key project personnel.

B. Pre-Installation Submittal

1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Design Consultant.
2. The Contractor is responsible for notifying and obtaining written approval via RFI from the Architect/Design Consultant/Owner of any proprietary devices, software, and/or installation processes.
3. Contractor is responsible for obtaining permits as required in accordance with the authority having jurisdiction (AJ) local, city, state, federal, and/or applicable law requirements.
4. Contractor shall ensure submittals are submitted in 10 business days to ensure all products can be ordered and received on site in order to not cause any delays. Any products having long lead times (more than 60 days) that may negatively impact the schedule shall be clearly identified in writing so the review and approval can be expedited.
5. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.) Submittals not in the proper sequence will not be approved.
6. Contractor shall provide the following as part of their submittal:
 - a. Manufacturer product data sheets for each proposed system component.

1. For product data sheets containing more than one part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified will not be approved.
 2. Contractor shall identify any products that are discontinued, end of life, or near end of life, and shall propose equal alternate to the discontinued product in writing.
- b. Manufacturer Product Certifications for Company.
 - c. Manufacturer Product Certifications for Installers.
 - d. Manufacturer Warranty letters.
 - e. Documentation indicating that Contractor has been in business for 5 years.
 - f. Address of Contractor's local office within a 75-mile radius of the project site.
 - g. Quantity of full-time, local technicians within a 75-mile radius of the project site.
 - h. List of five contractor-installed projects of a similar size and scope that have been in operation for at least one year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
 - i. List of completed and ongoing projects with the owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.
 - j. List of subcontractors performing any work on the project. List shall clearly identify the subcontractor's legal name and address, the scope of work to be performed by the subcontractors and the overall percentage of the project being provided by the subcontractor. If there are no subcontractors performing any work on the project, submit a statement on company letterhead clearly indicating no subcontractors will be performing any work on this project.
 - k. Manufacturer's certification letter confirming that the proposed intrusion detection system components do not have any known cybersecurity notices, bulletins, or alerts. If a vulnerability is discovered, the contractor shall notify the Architect/Design Consultant within 24 business hours. Provide the make and model of the associated equipment and the vulnerability.
 - l. Manufacturer cybersecurity hardening guide. If one is not available, provide documentation from the manufacturer stating such.
 - m. A complete set of shop drawings to include at minimum but are not limited to:
 1. Device locations
 2. Cable Type and Pathways
 3. Panel Termination Schedule
 4. Elevation Drawings to illustrate the associated devices and the heights at which they will be installed.
 5. Naming Convention Information
 6. Signal Flow Diagram including full topology.
 - n. Supplemental documents to include but not limited to:
 1. Safety Plan
 2. Contractor A/C Document
 3. Construction Schedule in a Gantt chart format
 4. Contractor Cybersecurity Hardening Guide

PART 2 - PRODUCTS

2.1 EQUIPMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.

- B. Unless otherwise stated, all software and licensing shall be for the most current, up to date version of the system provided. For existing systems, Contractor shall obtain written verification of the Owner's most current software version and notify via RF the Architect / Design Consultant / Owner if implementation of the most current software / license version will require an upgrade to the Owner's existing system.
- C. Architect / Design Consultant will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- D. Proposed equipment items must be approved in writing by the Architect / Design Consultant prior to purchase or installation. Proposed equipment items must meet or exceed these specifications and the specifications of the specified item.
- E. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall submit a formal RF for an appropriate substitute.
- F. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished at no additional cost to the owner.
- G. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
- H. Labels on all cabinets, materials, and equipment must indicate a nationally recognized testing laboratory.
- I. Original Equipment Manufacturer (OEM) documentation must be provided to the Architect / Design Consultant which certifies performance characteristics and compliance with ANSI/TIA/EIA 568-C standards where applicable.
- J. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect / Design Consultant. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues, and the Contractor will have all products on site when needed to complete the job as per the project schedule.
- K. Quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a fully functional system. Where quantities are not noted, they may be obtained from the drawings.
- L. All software, hardware, and equipment from the date of RFP shall be tested, currently available and commercially off the shelf product. (COTS)
- M. Written approval must be obtained from the Owner / Architect / Design Consultant for any proprietary or custom software and/or equipment prior to the beginning of the project.

2.2 ACCEPTABLE MANUFACTURES

A. Control Panels

1. Honeywell/Ademco, ISTAR250BPT - Primary Communication via Network

B. Modules

1. Intrusion Communicator (ABS) Cellular (Backup) - Owner Furnished / Contractor Installed
 - a. Granite Epik Solution
2. Honeywell/Ademco Eight (8) Line Input Expander
 - a. ISTAR 4208
3. Intelligent Relay Board - (8) Line Controls
 - a. Ademco 4204
4. (8) Line Single Output Relay Module
 - a. Ademco 4101SN

C. Enclosures

1. Honeywell/Ademco Sized as Required
 - a. Tamper Switch

- b. Lock and Key
- D. Power Supplies/Character/Battery Backup
 - 1. Enclosed Altronix A Series
 - 2. Or approved equal
- E. Power Distribution Module Board
 - 1. Enclosed Altronix PD8
 - 2. Enclosed Altronix PD4
 - 3. Or approved equal
- F. Battery
 - 1. Quasarp7-12
 - 2. Or approved equal
- G. Keypads
 - 1. Honeywell/Ademco Alpha Keypad, Vista 6160
- H. Motion Detectors
 - 1. Bosch Panoramic 360 Ceiling 60' Motion Doctor Detector, Part Number DS938
 - 2. Bosch Panoramic 360 Ceiling 25' Motion Detector, Part Number DS936
 - 3. Bosch TriTech 60x60 PIR Microwave Motion Detector, Part Number DS860
 - 4. Bosch TriTech Non-Panoramic PIR Detector Part Number DS720
- I. Motion Detector Case (All devices in Gyms)
 - 1. 7 in W x 5.75 in H x 4.5 in D – Part Number STI9621
 - 2. 12 in W x 12 in H x 8 in D – Part Number STI9731
 - 3. Or approved equal
- J. Door Contacts
 - 1. recessed SPST
 - a. I 18012
 - b. I 19512 DPDT
 - c. Or approved equal
 - 2. Surface Mount with armored cable
 - a. I 4402A
 - b. I 4405A DPDT
 - c. Or approved equal
 - 3. Overhead Door Position Switch
 - a. Amseco DC59A
- K. Duress Button
 - 1. SP B2SA Momentary
- L. Siren
 - 1. Self-Contained Dual Tone Surface Mount Siren

- a. SS2
- M. Intrusion Detection Wiring
 - 1. Wake Cable, Color Orange and Plenum Rated Cable shall be sized based on length
 - a. Keypad – 18 AWG 4-Conductor
 - 1. Wake Cable Part # P184C
 - 2. Or approved equal
 - b. Motion Detectors 18 AWG 4-Conductor
 - 1. Wake Cable Part # P184C
 - 2. Or approved equal
 - c. Door Contact – 22 AWG 2-Conductor
 - 1. Wake Cable Part # P222C
 - 2. Or approved equal
 - d. Duress Button 18 AWG 4-Conductor
 - 1. Wake Cable Part # P184C
 - 2. Or approved equal
 - e. Siren – 18 AWG 2-Conductor
 - 1. Wake Cable Part # P182C
 - 2. Or approved equal
 - f. Intelligent Relay Board (Intin Controls) – 18 AWG 6-Conductor Coordinate FBISD cable color for Intin Controls
 - 1. Wake Cable Part # P186C
 - 2. Or approved equal
 - g. Communication Cable
 - 1. Wake Cable Part # P184C
 - 2. Or approved equal
- N. Pathway Cable Support
 - 1. Panduit J-Mod Cable Support System
 - 2. Erico – CADD CAT IN'S J-Mod Series
 - 3. Panduit Plenum Rated Hook Loop Plenum Rated, Black
 - g. Labeling
 - 1. Permanent Labels for Copper Cables
 - a. Panduit Self-Adhering Labels
- P. Fire Stop
 - 1. STI Spec Seal
 - 2. 3M Products

PART 3 - EXECUTION

- 3.1 CODES, STANDARDS, EQUIVATINGS
 - A. American National Standards Institute (ANSI)
 - B. American Society for Testing and Materials (ASTM)

1. ASTM B 1 [2001][2007] Standard Specification for Hard Drawn Copper Wire
 2. ASTM B 8 [2004] Standard Specification for Concentric Lay Stranded Copper Conductors, Hard, Medium Hard, or Soft
 3. ASTM D 1557 [2007] Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft³ / 2700 kN/m³)
 4. ASTM D 709 [2001][2007] Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
1. Telecommunications Distribution Methods Manual 13th Edition
 2. Outside Plant Design Reference Manual 5th Edition
 3. ANSI/BICSI 002 [2011], Data Center Design and Implementation Best Practices
 4. NECA/BICSI 568 [2006] – Standard for Installing Commercial Building Telecommunications Cabling
 5. NECA/BICSI 607 [2011], Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Federal Communications Commission (FCC)
1. FCC Part 15, Radiated Emissions Limits, revised 1998
 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 3. FCC Part 76, Cable Television Service, revised 1998
- F. Insulated Cable Design Consultants Association (ICEA)
1. ICEA S-87-640 [2006] Fiber Optic Outside Plant Communications Cable
 2. ICEA S-98-688 [2006] Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors
 3. ICEA S-99-689 [2006] Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- G. International Electrotechnical Commission (IEC)
- H. Institute of Electrical and Electronics Design Consultants, Inc. (IEEE)
1. IEEE Standard 81 [1983], IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 2. IEEE Standard 1100 [1999], Recommended for Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
 3. IEEE C2 [2007] Errata 2007 (NT 2008) National Electrical Safety Code
 5. IEEE Std 100 [2000] The Authoritative Dictionary of IEEE Standards Terms
- I. International Organization for Standardization (ISO)
1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
 2. ISO/IEC 11801, Information Technology Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14763-1, Information Technology Implementation and Operation of Customer Premises Cabling Administration, 1999
 4. ISO/IEC 11801, Information Technology Generic Cabling for Customer Premises, 1995
 5. ISO/IEC 14763-1, Information Technology Implementation and Operation of Customer Premises Cabling Administration, 1999

- J. National Cable Television Association (NCTA)
 - National Electrical Manufacturers Association (NEMA)
 1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
 - National Fire Protection Association (NFPA)
 1. NFPA 70, National Electrical Code
 2. NFPA 75, Protection of Electronic Computer Data Processing Equipment.
 3. NFPA 101, Life Safety Code
 4. NFPA 297, Guide on Principles and Practices for Telecommunications Systems
 5. NFPA 780, Standard for the Installation of Lightning Protection Systems.
- M. National Institute Standards and Technology (NIST)
- N. Occupational Safety and Health Administration (OSHA)
 - Security Industry Association (SIA)
- P. Telecommunications Industry Association (TIA)
 1. ANSI/TIA-568.0-D1, Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA-568.0-D1, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
 4. ANSI/TIA-568.3-D1 Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-D2, Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 7. ANSI/TIA-607-D, Commercial Building Grounding and Bonding Requirements for Telecommunications
 8. ANSI/TIA-758-C, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- U.S. Department of Agriculture (USDA)
 1. US 1755 Telecommunications Standards and Specifications for Materials, Equipment and Construction
 2. US Bull 1751F-643 (2002) Underground Plant Design
 3. US Bull 1751F-815 (1979) Electrical Protection of Outside Plant
 4. US Bull 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)
 5. US Bull 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)
 6. US Bull 345-65 (1985) Shield Bonding Connectors (PE-65)
 7. US Bull 345-72 (1985) Filled Splice Closures (PE-74)
 8. US Bull 345-83 (1979) Section 1982 Gas Tube Surge Arrestors (PE-80)
- Underwriters Laboratories, Inc. (UL)
 1. UL 294 Standard for Access Control System Units
 2. UL 294B Standard for Power Over Ethernet (PoE) Power Sources for Access Control Systems and Equipment
 3. UL 109 Standard Method for Flame Tests of Flame-Resistant Fabrics and Films

4. 1076 Standard for Proprietary Burglar Alarm Units and Systems

3.2 REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority within Jurisdiction within State of Texas, the National Fire Protection Association (NFPA) and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Designer Consultant for direction before proceeding with that part of the work.
- B. Contractor shall meet the specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines. Equipment and materials installed by the Contractor shall be free of defects and damage.
- D. No deviations from the plans, details or specifications shall be made without full consent in writing of the Architect/Designer Consultant. The Contractor shall have written approval from the Architect/Designer Consultant for any additional work beyond the Contract Documents prior to beginning such work.
- E. In the event site conditions do not allow the contractor to follow the execution requirements specified herein or in the provided details, the Contractor shall submit a written alternative means and methods that is approved in writing by the Architect/Designer Consultant.
- F. The Contractor shall obtain written permission from the Architect/Designer Consultant before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to: doors, beams, floors, walls, roofs, and/or ceilings.
 - . If the Contractor does not obtain written approval from the Architect/Designer Consultant prior to proceeding with the work, the contractor shall not be reimbursed for the work.
 - . Contractor shall notify the Architect/Designer Consultant a minimum of 2 weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Designer Consultant to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- I. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
- J. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
 - . Contractor shall test all cables prior to and post installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the owner should it be found defective at a later date.
 - . Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect/Designer Consultant.
- M. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
- N. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
 - . Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Designer Consultant.
- P. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
 - . Devices installed in public spaces shall be mounted and secured using tamper-proof security fasteners unless otherwise noted.
 - . Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the owner.

- S. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
- T. Cables shall be routed at 90 degree angles to the building structure. At no time shall a diagonal pull be installed.
 - . The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the owner.
 - . The manufacturer and contractor shall take positive measures to prevent the introduction of cybersecurity threats to the owners technology infrastructure. These measures shall include but are not limited to:
 1. The contractor shall scan contractor owned equipment for cyber threats such as viruses, malware, ransomware, etc., prior to connecting the contractor owned devices to the owners network.
 2. Ensure all technicians installing or configuring equipment are trained on the prevention of introduction of cyber threats to electronics, i.e., servers, and other associated equipment.
 3. All project documents shall be properly securely stored behind encryption and password protection to avoid unauthorized distribution of documents.
 - . Labeled Doors and Frames
 1. In no instance shall any unlabeled door or frame be drilled, cut, penetrated, or modified in any way.
 2. The Contractor shall be responsible for replacing any labeled door or frame that is modified without written approval from the Architect.

3.3 COORDINATION REQUIREMENTS

- A. The Contractor is responsible for the coordination of the following items and their respective disciplines included but not limited to.
- B. Coordinate with the Architect to ensure that:
 1. Adequate conduit is provided and that equipment backboxes are adequate for system installation.
 2. Adequate power has been provided and properly located for the security system equipment.
 3. Doors and door frames are properly prepared for electric locking hardware and door position switches.
 4. Access hatch locations when required shall be submitted in writing to the Architect and coordinated with the Architect.
 5. Finishes and colors of all equipment visibly installed in public areas. Submit all finish and graphics for all equipment to the Architect for approval prior to installation.
- C. Coordinate with the Division 8 contractor for the following:
 1. Door hardware manufacturer installation, power, and ADA requirements.
- D. Contractor is responsible for coordinating with gate controller installers for controller locations and interfacing terminations.
- E. Coordinate with the Division 26 contractor for the following:
 1. High voltage power pathways, grounding, and bonding requirements.
 2. Drive up pedestal pathways to the interior of the building.
 3. Pathways, rough ins, back boxes, and conduit sizes for all intrusion detection peripheral devices.
- F. Coordinate with the Division 27 contractor for the following:
 1. Installation and power requirements of network infrastructure associated to the specified Intrusion detection System
 2. Associated patch cable lengths and quantities required for the specified Intrusion detection System

3. Location, power, and backup requirements for rack mount equipment.

- . Coordinate with the Division 28 Fire Contractor for the following:
 - 1. Requirements associated with fire alarm systems.
- . The Contractor is responsible for coordinating intrusion detection locations and mounting preferences of all specified security devices with the Architect/Design Consultant prior to installation.
- I. The Contractor is responsible for coordinating all intrusion detection programming requirements with the Owner/Architect/Design Consultant.
- J. The Contractor shall coordinate with the Owner for the following:
 - 1. Naming Conventions of devices, controllers, doors, etc.
- . The Contractor is responsible for coordinating with the Intrusion Controls Contractor for Arm, Disarm, and alarm controls.

3.4 SYSTEM REQUIREMENTS

- A. Provide equipment as indicated on the drawings and specified herein. Additional specific installation requirements are as follows:
 - 1. The Intrusion detection System control panels, zone expanders, motion sensors, door contacts, intrusion detection cabling, and all other peripheral components as indicated on the drawings and specified herein.
 - 2. Any devices associated with the installation shall have the latest firmware updates downloaded via owner approved secure link from the system software and/or remotely from the manufacturer.
 - 3. All Intrusion detection software, equipment and system requirements shall be installed per their respective Manufacturer Installation Guidelines.
- B. Control Panel
 - 1. The Control panel shall be the main point of programming, monitoring, accessing, securing, and troubleshooting the IDS.
 - 2. The Control Panel shall be wall mounted in the "SR" room(s).
 - 3. The Control Panel shall provide a means contact FBISD Dispatch via a Cellular communicator interface.
 - 4. The Control panel shall utilize a Multifunctional keypad, Input and Output Modules for expansion of alarm zones, interfacing with additional security subsystems, programming, monitoring, and controlling the IDS.
 - 5. Control Panel cables shall be neatly routed with slack and each cable shall have printed labels 6 inches from each end.
 - 6. Control Panel spare cables shall be securely tucked away with slack, clearly labeled and with all cable ends capped.
 - 7. Every motion sensor shall be monitored via Power Distribution Module individually fused to protected outputs as required.
 - 8. Control Panel shall be powered by a hardwired wall mounted UL listed power supply.
 - 9. Auxiliary Power Output:
 - a. 9.6VDC/13.8VDC, 750mA max.
 - b. For UL installations, the accessories connected to the output must be UL listed, and rated to operate in the above voltage range.
 - 10. Backup Battery is required
- C. Input Modules

1. EIGHTONE expander that allows the use of available expansion zones on the Intrusion Detection System.
 2. Input Modules shall be wall mounted in the "SR" room(s) as required.
 3. Every motion sensor shall be monitored via Power Distribution Module individually fused to protected outputs as required.
 4. Input Modules shall be powered from an external DC power supply as listed as required.
 5. Shall be installed per manufacture's guidelines.
- D. Intelligent Relay Board / I/O Controls
1. Shall be mounted in the mechanical room in the Intrusion Control Panel location.
 2. 1/8" orange plenum cable shall be routed from intelligent relay board to the I/O Controls Panel and leave 20 feet coiled at the I/O Controls Panel.
 3. Coordinate with the I/O Controls contractor for the I/O Controls to pick up the "armed, disarmed, and activated" status points of the Intrusion system.
 - a. Interlock with security system to turn off all contactor controlled fixtures upon arming of system.
 - b. Interlock with security system to turn on all contactor controlled fixtures upon intruder activation.
 - c. Interlock with security system to enable partial lighting when system is first disarmed via contactor schedule.
 - d. Intent is to have three inputs from security system: armed, disarmed and activated.
 - e. The security integrator needs to provide 3 inputs from the intrusion panel for the three conditions noted in a, b, c. noted above.
 4. Shall be installed per manufacture's guidelines.
- E. Power Supplies / Charger / Battery Backup
1. Provide as listed power supplies for all Intrusion Detection System equipment as specified.
 2. Provide power supplies with battery chargers and backup batteries.
 3. Shall be installed per manufacture's guidelines.
- F. Power Distribution Module Board
1. Shall securely mounted be in as listed enclosure.
 2. Shall be installed per manufacture's guidelines.
- G. Battery
1. Shall securely mounted be in as listed enclosure.
 2. Batteries shall have the installation date clearly labeled with printed labels.
 3. Batteries shall be on anti-static pads as required.
 4. Shall be installed per manufacture's guidelines.
- H. Keypad
1. A multifunctional keypad shall be utilized as a user interface for arming, disarming, monitoring, troubleshooting, and programming the alarm control panel.
 2. Orange plenum rated 18 AWG 4-Conductor as required.
 3. Shall be installed per manufacture's guidelines.
- I. Motion Detection Devices
1. The IDS shall consist of interior, exterior, and other detection devices that are capable of:
 - a. Locating intrusions at individually protected asset areas or at an individual portal.
 - b. Locating intrusions within a specific area of coverage.

- c. Location failures or tampering of individual sensors or components.
 - 2. Provide and adjust for devices so that coverage is maximized in the space or area it is installed in. For large rooms where multiple devices are required, ensure device coverage is overlapping.
 - 3. Detection sensitivity shall be set up to ensure maximum coverage of the secure area is obtained while at the same time limiting excessive false alarms due to the environment and impact of small animals. All detection devices shall be anti-mask with exception of video motion detection.
 - 4. TriTech sensor technology shall be used when possible. Sensor technology shall not be of the same type that is easily defeated by a single method. This will reduce the amount of false alarms.
 - 5. Environmental Conditions: Systems shall be able to operate in environmentally protected interior and/or exterior areas and shall meet operational performance requirements for the ambient conditions.
- J. Panoramic 360 Ceiling Motion Sensors
- 1. Provide 360 Ceiling Motion Sensors as indicated on drawings to monitor movement and create alarm condition upon detection when device is armed.
 - 2. Provide the manufacturer recommended power supply. The power supply shall be Class 2, power limited.
 - 3. Every motion sensor shall be monitored via Power Distribution Module individually fused to protected outputs as required.
 - 4. Ceiling Motion Sensors shall be mounted on drop tile as indicated on TS Typical Details sheets.
 - 5. Range plenum rated 18 AWG 4-Conductor as required.
 - 6. Shall be installed per manufacture's guidelines.
- K. TriTech Technology Motion Sensor
- 1. Provide TriTech technology motion sensors as indicated on drawings to monitor movement and create alarm condition upon detection when device is armed.
 - 2. Provide the manufacturer recommended power supply. The power supply shall be Class 2, power limited.
 - 3. Every motion sensor shall be monitored via Power Distribution Module individually fused to protected outputs as required.
 - 4. TriTech Technology Motion Sensor shall be wall mounted as indicated on TS Typical Details sheets.
 - 5. Range plenum rated 18 AWG 4-Conductor as required.
 - 6. Shall be installed per manufacture's guidelines.
- L. Conceal Motion
- 1. Provide TriTech Conceal Motion technology motion sensors as indicated on drawings to monitor movement and create alarm condition upon detection when device is armed.
 - 2. Provide the manufacturer recommended power supply. The power supply shall be Class 2, power limited.
 - 3. Every motion sensor shall be monitored via Power Distribution Module individually fused to protected outputs as required.
 - 4. TriTech Technology Conceal Motion shall be wall mounted as indicated on TS Typical Details sheets.
 - 5. Range plenum rated 18 AWG 4-Conductor as required.
 - 6. Shall be installed per manufacture's guidelines.
- M. Door Position Switches
- 1. Provide normally closed magnetic concealed door position switches, surface mount door position switches and overhead door position switches to monitor the open/closed status of doors as specified herein and as indicated on the drawings.

2. Provide armored cable as required from the switch location to the associated junction box in order to conceal the wire.
3. Run one plenum rated 22 AWG 2-Conductor as required.
4. Shall be installed per manufacture's guidelines.

N. Duress Button

1. Shall be under desk mounted with flex conduit neatly secured to desk with security screws.
2. Run one plenum rated 18 AWG 4-Conductor as required.
3. Shall be installed per manufacture's guidelines.
4. Duress Button shall call FBISD PD when in alarm mode.

O. Tamper Switches

1. The following IDS sensors shall be used to monitor and detect potential tampering of sensors, control panels and enclosures.
2. Tamper Switches: All enclosures including cabinets, housings, boxes, raceways, and fittings with hinged doors or removable covers containing circuits and power supplies related to the IDS shall include corrosion-resistant tamper switches.
3. Tamper alarms shall be annunciated to be clearly distinguishable from IDS alarms.
4. Tamper switches will not be in a viewable from a direct line of sight perspective. The minimum amount of time the tamper switch becomes active and sends a signal after an enclosure is opened or panel removable is attempted, shall be one (1) second.
5. Tamper switches will initiate when enclosure doors or covers is removed as little as 6.35 mm (1/4 inch) from the closed position unless otherwise indicated. Tamper switches shall be:
 - a. Push-pull automatic reset type
 - b. Inaccessible until switch is activated
 - c. Spring-loaded and held in closed position by door or cover
 - d. Wired to break a circuit when door or cover is removed
6. Fail-Safe Mode: Shall provide the capability to detect and annunciate diminished functional capabilities and perform self-tests. Fail-Safe alarms shall be annunciated to be clearly distinguishable from other types of alarms.
7. Run one plenum rated 22 AWG 2-Conductor as required.
8. Shall be installed per manufacture's guidelines.

P. Intrusion Detection Cabling - Run one jacket (no exceptions)

1. Pathways
 - a. Cables shall be routed utilizing the pathways as indicated in the technology and security drawings. Reference Division 27 specifications for additional requirements.
 - b. Intrusion detection cabling shall be routed separate from the network data communication cables specified in Division 27. Contractor shall provide separate pathways and j-hooks for the cables specified herein.
2. Wiring Techniques
 - a. All cables shall be pre-tested for shorts prior to final device terminations after cables are installed.
 - b. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored in the provided enclosure as detailed in the drawings. If an enclosure is not provided for the specified devices herein, the service loop shall be installed on a j-hook in the nearest accessible ceiling space closest to the device.
 - c. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored at the intrusion detection panel.

- d. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored on the wall in the regional mechanical room.
 - e. Install code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where the penetrations are made by or used for installation of the ACS.
 - f. All wire and cable shall be continuous from device location to the final point of termination ("Home Run"). No mid-run cable splices shall be allowed.
 - g. Wire and cable within control panels, power distribution cabinets and other security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to the equipment within the enclosure. All wire and cable shall be bundled and tied. Velcro cable ties shall be utilized.
 - h. Neatly bundle and wrap all horizontal and vertical runs above accessible ceilings and not within conduit/wire and cable at intervals as code requires. Provide supports as required. All supports shall be UL listed for the application.
 - i. All system wiring within vertical riser shafts as required shall be bundled, wrapped, and tied to the structure at one-meter intervals in order to isolate it from other wire and cable within the shaft. Additionally, all wire and cable within the shaft shall be supported at least every two floors using manufacturer approved vertical management hardware and installation methods. Provide all personnel and equipment necessary to install and support the cable. All equipment shall be UL listed for the application.
 - j. Provide rommets and strain relief material where necessary to avoid abrasion of wire and excess tension on wire and cable.
3. Splices and Transitions
- a. Home run cabling is the preferred method of installation for all Intrusion detection System devices and panels.
 - b. In the unlikely event that a splice or transition is required, the Contractor shall identify all splice and transition points required for the completion of the project and confirm, in writing, in advance, via RFI with the Architect/Design Consultant for acceptance of the proposed wiring techniques to be utilized.
 - c. By not submitting an RFI, Contractor acknowledges that no major splicing is required for the completion of this project. Any splices not previously identified that are found to be faulty shall require the Contractor to re-install the affected cable in its entirety at no cost to the owner.
 - d. Contractor shall clearly mark splice and transition points on the shop drawings and As-Built drawings as part of the project closeout.
4. Cable Dressing
- a. No excessive cable slack shall be left in enclosures.
 - b. Cables shall be dressed in a professional manner.
 - c. Cables shall be routed in 90-degree angles to termination points inside enclosures.
 - d. Ty raps and zip ties are not permitted, hook and loop velcro is acceptable.
 - e. Exposed wires are not acceptable.
 - f. Enclosures and equipment in Telecommunication room shall be left clean without debris including but not limited to: labels, connectors, screws, etc.
 - g. All spare unused cables shall be in the enclosure shall be neatly coiled and protected to avoid any shorts to ground.
5. Labeling
1. Contractor shall verify room numbers and confirm the final room numbering scheme and Owner's current standard in writing in advance via RFI prior to generating any labels.
 2. Cables overall sheath shall be labeled within 6 inches from the point the cable enters/exits the enclosure inside the Equipment Room/Telecommunications/Security Control Location Rooms.

3. Cables shall be labeled within 1/4 inch from the termination point inside the Equipment Room or Telecommunications/Security Control Location Rooms.
 4. Cables shall be labeled within 1/4 inch from the termination point at the device end.
 5. Cables shall be labeled identically at both ends.
 6. Label all controls as necessary to agree with their function.
 7. All labeling in the field shall match the same labeling scheme in the closeout documents.
- Q. Fire Stop/Smoke/Sound Sealants
1. Use proper sealant as recommended by the manufacturer for the specific application in compliance with per all applicable codes: City, State, Federal, A/J.
 2. All existing pathways shall be resealed in compliance with per all applicable codes: City, State, Federal, A/J.
- S. Grounding and Bonding
1. The Contractor shall ensure metal-to-metal contact for all grounding terminations.
 2. All materials shall be listed.
 3. All connections shall be made with listed compression 2-hole lugs.
 4. Contractor shall use an anti-oxidation compound on all connections.
 5. In a metal frame structural steel building, where the steel framework is readily accessible within or external to the room each TMB and TTB shall be bonded to the vertical steel metal frame using a minimum 6 AWG plenum rated green insulated conductor.
 6. A grounding/qualifier conductor shall be installed when required by ANSI/TIA/EIA-607-B Interconnects multiple TBBs on the top floor and every 3rd floor in between.
 7. The connection to building steel does not eliminate the requirement for the TBB or EBC to the service ground.
 8. Equipment Bonding Conductor (EBC)
 - a. Contractor shall furnish and install a minimum 6 AWG plenum rated green insulated conductor from the TMB or TTB as applicable to each ladder rack system, equipment rack, cabinet, metallic raceway, lightning protector, or multi-pair cable with a metallic element. Contractor shall use an anti-oxidation compound on all connections.
 - b. When exceeding 13 feet the EBC shall be sized at 2 kcmil per linear foot of conductor length up to a maximum of 750 kcmil.
- T. Conduit, Boxes and Raceways (For Reference Only - By Division 26)
1. Install all conduit necessary for a complete installation, but not provided for in the Security Drawings, in finished areas concealed in chases, furring's, concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.
 2. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, industry standard installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets, or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.
 3. All conduits shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.
 4. All required inserts shall be drilled in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.
 5. Swab out and remove all burrs from conduit before any wires are pulled.
 6. Lay out and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the corner of the pipe crossed.

7. Provide fire stops where conduits penetrate fire rated walls and/or floors.
 8. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Architect.
- . □i□h □olta□e □120□AC□Power □e□uirements □For □eference □nly – by Division 26□
1. 120□AC AC power dedicated to security shall be provided by the electrical contractor for the Intrusion detection system as indicated on drawings. Coordinate with the Architect to establish locations of security dedicated 120□AC AC circuits.
 2. Connect to the AC power □provided by electrical contractor□and provide □□ listed power supplies and transformers to distribute low □volta□e power to the system components as required.
 3. Provide all conduit and wiring from the AC power facilities to the Intrusion detection □Power Supply Enclosures.
 4. Provide Mechanical separation to isolate 120□AC wires from other low □volta□e cabling. □ow □olta□e cabling shall not route over/under/parallel to 120□AC wires.
- . Surge Protection □□□htnin□ Arrestors
1. Protect all exterior or interior devices, control, power, signal cables and conductors that are power surges. Each surge protector shall be □□ listed.
 2. □less otherwise noted, surge protection devices shall be installed at both the end and head end of the cabling run.
 3. Surge devices shall be installed as close as accessibly possible to the equipment they are protecting.
 4. Surge Protection shall be properly installed in an accessible ceiling or enclosure space to allow for cable removal during troubleshooting.
 5. Include surge protection device locations on as-builts and shop drawings.
 6. Provide protection against spikes, surges, noise, and other line problems for all system equipment and components.
 7. Properly ground surge protection devices per the manufacturer installation requirements.

3.5 SYSTEM PROGRAMMING AND DATA ENTRY

- A. Provide all initial system programming and setup of the IDS including, but not limited to the following:
1. Graphical maps and icons. Coordinate with the Architect to obtain AutoCAD □E□IT architectural backgrounds for implementation as graphical maps. Import all AutoCAD □E□IT background information provided by the Architect and produce a complete set of graphical maps depicting all IDS points.
 2. IDS device information. Coordinate all device values and text, including descriptors, alarm messages, map call up and identification with the Architect.
 3. Input and output points for the IDS. Coordinate all input and output priorities and text, including descriptors, alarm messages.
 4. Contractor shall coordinate with FBISD Design Manager for online, global linking, and keypad requirements prior to programming Intrusion Detection System.
- B. Enter all data needed to make the Security System operational. Deliver the data to the owner on data entry forms, utilizing data from the Contract Documents, Contractor's field surveys and all other pertinent information in the Contractor's possession required for complete installation of the database. Identify and request from the Architect any additional data needed to make the Security System fully operational and integrated. The completed forms shall be delivered to the owner for review and approval prior to the Contractor's scheduled need date.

3.6 TESTING REQUIREMENTS

- A. Provide a test report showing the system has been 100% tested and in 100% operational prior to training demonstration.
- B. System Start-up
1. The work shall be complete and ready to operate prior to final acceptance.

2. The Architect shall assist in establishing procedural guidelines and in defining terminology and conditions unique to the Owner's operation.
- C. Substantial Completion
1. In order to qualify for the Architect's consideration of Substantial Completion, the Work must, at a minimum, meet the following requirements:
 - a. Installation of all devices must be completed.
 - b. All subsystem interfaces must be complete and operational.
 2. Substantial Completion shall not be misconstrued as final acceptance of the Work.
- D. System Acceptance
1. Final acceptance testing of the Work will be conducted by the Architect.
 2. Prior to any final acceptance testing, the Contractor shall submit two sets of preliminary draft Record Drawings to the Architect. The preliminary Record Drawings are to be used by the Architect to conduct the system final test.
 3. Before system acceptance testing the Security Contractor shall conduct a complete in-house AIC test of the entire Intrusion detection System and provide a written report on the results of that test. During the AIC test the Security Contractor shall place the ACS in service mode and calibrate and test all equipment.
 4. Following completion of the initial testing and correction of any noted deficiencies, conduct a five-day burn-in test. The intent of the burn-in test shall be to prove the Intrusion detection system by placing it in near real operating conditions. During this period, the Intrusion detection system shall be fully functional and programmed such that all points, interfaces, controls, reports, messages, prompts, etc. can be exercised and validated. Record and correct any system anomaly, deficiency, or failure noted during this period. Scheduling of the final acceptance test shall be based on a review of the results of this burn-in test.
 5. Deliver a report describing the results of functional tests, burn-in tests, diagnostics, calibrations, corrections, and repairs including written certification to the Architect that the installed complete Intrusion detection system has been calibrated, tested, and is fully functional as specified herein.
 6. Prior to the final acceptance test, coordinate with the Architect for security related construction clean up and patch work requirements. Security equipment closets and similar areas should be free of accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, remove all waste materials, rubbish, the Contractor's and its subcontractors' tools, construction equipment, machinery, and all surplus materials.
 7. Upon written notification from the Contractor that the Intrusion detection system is completely installed, integrated and operational, and the burn-in testing completed, the Architect will conduct a final acceptance test of the entire system.
 8. During the course of the final acceptance test by the Architect, the Contractor shall be responsible for demonstrating that, without exception, the completed and integrated system complies with the contract requirements. All physical and functional requirements of the project shall be demonstrated and shown. This demonstration will begin by comparing "as built" conditions of the Intrusion detection system to requirements outlined in the Specification, item by item. Following the Specification compliance review, all Intrusion detection system head-end equipment will be evaluated.
 9. The functionality of the various interfaces between systems will be tested.
 10. Following the Intrusion detection system head-end equipment and console review, the installation of all field devices will be inspected. This field inspection will weigh heavily on the general neatness and quality of installations, complete functionality of each individual device, and mounting, backbox and conduit requirements compliance.
 11. All equipment shall be on and fully operational during any and all testing procedures. Provide all personnel, equipment, and supplies necessary to perform all site testing. Provide a minimum of two employees familiar with the system for the final acceptance test. One employee shall be responsible for monitoring and verifying alarms while the other will be required to demonstrate the function of each device. Supply at least two two-way radios for use during the test. A manufacturer's representative may be present on site to answer any questions that may be beyond the technical

capability of the Contractor's employees, if the Contractor so elects or by specific request of the Architect or Owner, at no charge to the Architect or Owner.

12. Upon successful completion of the final acceptance test or subsequent punch list retest the Architect will issue a letter of final acceptance.
13. The Architect retains the right to suspend and/or terminate testing at any time when the system fails to perform as specified. In the event that it becomes necessary to suspend the test, all of the Owner's/Architect's fees and expenses related to the suspended test will be deducted from the Contractor's retainage. Furthermore, in the event it becomes necessary to suspend the test, the Contractor shall work diligently to complete/repair all outstanding items to the condition specified in the Specification and as indicated on the Drawings. The Contractor shall supply the Architect with a detailed completion schedule outlining phase by phase completion dates and a tentative date for a subsequent punch list retest. During the final acceptance test, no adjustments, repairs, or modifications to the system will be conducted without the permission of the Architect.

3.7 TRAINING

- A. Provide for 40 hours of training for two (2) persons on each system.
- B. Provide a test report showing the system has been 100% tested and 100% operational prior to training or demonstration.
- C. Coordinate with the Owner to establish a training outline and schedule. Submit a comprehensive training curriculum to the Owner once all preliminary coordination is complete. The Owner will review and comment on the curriculum as required.
- D. Operator training shall include, but not be limited to the following:
 1. All operating procedures
 2. System configuration
 3. Alarm acknowledgment, alarm response logging
- E. Administrative training shall include, but not be limited to the following:
 1. All operating system procedures and configuration variables
 2. Report generation
- F. Record, label, and catalog all training on DVD and "user's manual" written specifically for the school personnel onsite, for daily routine operations of the systems. Provide the DVD and user's manual to the Owner for future in-house training sessions and for reviews. Furnish all temporary equipment necessary for recording all training sessions. Maintain accurate and up-to-date time sheets of all training sessions.
- G. The Contractor shall be on call during the warranty to answer any questions the Owner might have. The Owner reserves the right to use any excess training hours, not used by the time of system completion, for future training as requested by the Owner until the total number of training hours has been completed.
- H. The Contractor shall be on call during the warranty to answer any questions the Owner might have. The Owner reserves the right to use any excess training hours, not used by the time of system completion, for future training as requested by the Owner until the total number of training hours has been completed.

3.8 PROJECT CLOSEOUT DOCUMENTATION REQUIREMENTS

- A. As-Built Drawings
 1. As built drawings for the security systems must include model number, serial number, and installed location for each security device (i.e., keypad, motion sensor, door contact, etc.).
 2. Electronic pdf as-built drawings will be required for final closeout. Close out drawings must include final installed locations, model numbers and serial numbers of all installed equipment.
 3. Drawings shall be provided to the Architect or Owner or Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect or Owner or Design Consultant.
 4. Unless otherwise requested, Contractor shall provide digital copies of closeout documents, and deliver to the Architect or Owner or Design Consultant electronically.

5. As-Built drawings shall be produced in AutoCAD file in the most current or compatible version and provided electronically in .dwg and/or .pdf format.
 6. Drawings shall be provided in the original size as issued by the Architect or Design Consultant.
 7. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect or Design Consultant.
 8. Provide a conformed set of Drawings as related to the project, depicting the condition of the intrusion detection system as installed to include but not limited to:
 - a. ASI, P&ID and Addendum items installed throughout the duration of the project.
 9. Provide a hard copy of the conformed set of drawings to be physically stored at the end of the project in a designated Intrusion detection System enclosure. Coordinate with Owner for final storage location.
 10. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of the following not limited to:
 - a. Intrusion detection System riser Signal Flow Diagrams
 - b. Intrusion detection System Backboard layouts
 1. To include intrusion detection boards, power supplies, pathways, etc.
 - c. Sleeves, Backbone Cabling and Communication pathways
 - d. Intrusion detection System device locations and labeling scheme.
- B. Operation & Maintenance Manuals
1. Unless otherwise noted, provide O&M manuals electronically to Owner to include all drawings, product datasheets, hardware manuals as related to the project.
 2. Coordinate with the Owner for provision of physical storage devices (hardcopy, Flash Drive, CDs/DVDs)
- C. Manufacturer's Product Warranty
1. Certificate of product warranty shall be provided to the Architect or Owner or Design Consultant at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Architect or Design Consultant.
 2. The manufacturer of the solution shall furnish a product warranty as per the specifications starting at final system acceptance.
 3. One original and two copies of the Manufacturer's product warranty shall be provided.
- D. Contactor's Statement of Warranty
1. Statement of warranty shall be provided to the Architect or Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect or Design Consultant.
 2. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor and workmanship starting at final system acceptance.
 3. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.

END OF SECTION 281600

SECTION 28 23 00 - VIDEO SURVEILLANCE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section identifies the requirements, technical design, and specifications for the Video Surveillance system at the Fort Bend ISD Triplex Center Renovations, located in Sugarland, Texas ("Owner"). The video surveillance system as specified is an industry-standard shall be an extension of the district's existing system and includes network video recorder(s)/server(s), software, licenses, cameras, mounts, and cabling as specified.
- B. It is the Contractor's responsibility to review this specification and associated project specifications and drawings in their entirety, prior to bidding on the project. By bidding on this project, the contractor acknowledges that they have read and fully understand these specifications, with no exceptions. Contractor shall review the drawings, specifications, and existing conditions prior to bidding on the project. Any discrepancies shall be brought to the attention of the architect/Design Consultant via request for information (RFI) in writing for evaluation and or clarification. If these items are not brought to the attention of the architect/Design Consultant the more costly or difficult manner, and the better quality or greater quantity of work shall be provided by the contractor in accordance with the architect's/Design Consultant's interpretation at no additional cost to the owner. Contractor shall verify the installation methodology of each device location prior to proceeding with installation. Potential obstructions or mounting conflicts due to changing conditions shall be identified via written RFI for approval with the Owner / Architect / Design Consultant.
- C. Contractor shall furnish and install all materials, equipment, and labor necessary to provide a complete and functional turn-key Video Surveillance system regardless of any items not listed or described in this specification or associated drawings.
- D. Requirement Sections Table of Contents
 - 1.3 Contractor Experience Requirements
 - 1.4 Submittal Requirements
 - 2.1 Products – General Requirements
 - 2.2 Acceptable Manufacturers
 - 3.1 Codes, Standards and Regulations
 - 3.2 Execution - General Requirements
 - 3.3 Coordination Requirements
 - 3.4 System Requirements
 - 3.5 Testing Requirements
 - 3.6 Training Requirements
 - 3.8 Substantial Completion
 - 3.9 Project Closeout Documentation

1.2 RELATED REQUIREMENTS

- A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 28 and shall be complied with in every respect. The Contractor shall examine all the items which make up the Contract Documents and shall coordinate them with the work on the project.

1.3 CONTRACTOR EXPERIENCE REQUIREMENTS

- A. The Contractor shall be a certified Panasonic / Video Insight Video Management System Preferred Partner prior to submitting a bid for the work.

- B. The Contractor shall possess all relevant Panasonic / Video Insight Manufacturer Certifications (i.e., video surveillance systems, hardware installation, software installation and programming) for both the company and individual technicians prior to submitting a bid for the work.
- C. The Contractor shall have a Panasonic / Video Insight manufacturer certified technician onsite throughout the duration of the installation phase of the project.
- D. The Contractor's Project Manager shall be dedicated to this project for the duration of the project and shall be available for all onsite coordination meetings.
- E. The Contractor shall have been in business for a minimum of five (5) years.
- F. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.
- . The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.
- . Licensed in the State of Texas.
- I. Submitting Contractor must be certified to install products and services for systems they are proposing. No subcontract of services will be allowed for any security scope of work. Contractor must submit to the Owner prior to starting any work the factory training certifications for all personnel that will be working on the system.

1.4 SUBMITTAL REQUIREMENTS

- A. Bid / Proposal Submittal
 - 1. Contractor shall provide as part of their bid/proposal:
 - a. Breakdown of proposed parts and labor required for the completion of the project. Include documentation showing annual licensing cost of ownership.
 - b. Proposed construction schedule in a Gant chart format
 - c. Contractor Safety Plan detailing safety practices around the jobsite.
 - d. Contractor QA / QC process detailing processes and procedures to ensure quality workmanship during installation and troubleshooting.
 - e. A detailed description of the installation team(s) that would perform the work.
 - f. A resume for each of the key project personal.
- B. Pre-Installation Submittal
 - 1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect / Design Consultant / Owner.
 - 2. The Contractor is responsible for notifying and obtaining written approval via RFI from the Architect / Design Consultant / Owner of any proprietary devices, software, and/or installation processes.
 - 3. Contractor is responsible for obtaining permitting as required in accordance with the authority having jurisdiction (AHJ), local, city, state, federal, and/or applicable law requirements.
 - 4. Contractor shall ensure submittals are submitted in 15 business days of award to ensure all products can be ordered and received on site in order to not cause any delays. Any products having long lead times (more than 60 days) that may negatively impact the schedule shall be clearly identified in writing so the review and approval can be expedited.
 - 5. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e., product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.
 - 6. Contractor shall provide the following as part of their submittal:
 - a. Manufacturer product data sheets for each proposed system component.

- 1 For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified will not be approved.
- 2 Contractor shall identify any products that are discontinued, end of life, or near end of life, and shall propose equal alternate to the discontinued product in writing.
- b. Manufacturer Product Certifications for Company.
- c. Manufacturer Product Certifications for Installers.
- d. Manufacturer Warranty letters.
- e. Documentation indicating that Contractor has been in business for (5) years.
- f. Address of Contractor's local office within a 75-mile radius of the project site.
- Quantity of full-time, local technicians within a 75-mile radius of the project site.
- h. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.
- i. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.
- j. List of subcontractors performing any work on the project. List shall clearly identify the subcontractor's legal name and address, the scope of work to be performed by the subcontractors and the overall percentage of the project being provided by the subcontractor. If there are no subcontractors performing any work on the project, submit a statement on company letterhead clearly indicating no subcontractors will be performing any work on this project.
- k. Manufacturer's Certification Letter confirming that the proposed video surveillance system components do not have any known cybersecurity notices, bulletins, or alerts. If a vulnerability is discovered, the contractor shall notify the Architect / Design Consultant / Owner within 24 business hours. Provide the make and model of the associated equipment and the vulnerability.
- l. Manufacturer Cybersecurity Hardening Guide. If one is not available, provide documentation from the manufacturer stating such.
- m. A complete set of shop drawings to include at a minimum but are not limited to:
 - 1 Proposed and/or samples of original contractor security schedules. Schedules are not to be copy/paste of schedules provided within the contract documents. Schedules proposed shall be utilized as part of As-Built drawings with coordination with Div. 27 for additional information as required for network components.
 - a Device and equipment schedules shall include at a minimum but are not limited to:
 - (1) Device Label
 - (2) Device Type
 - (3) Device Power Requirements
 - (4) Terminating MDF / IDF / Panel Location
 - b Additional networking information as required to include:
 - (1) Rack
 - (2) Network switch
 - (3) IP addresses

- (4) Patch panel
 - (5) Surge/lighting protection
 - (6) Power source
- 2☐ Elevation and Topography Drawings to illustrate the associated devices and equipment and the heights at which they will be installed.
 - 3☐ Signal Flow Diagram including full security topology.
- n. Supplemental documents to include at a minimum but are not limited to:
- 1☐ Contractor Safety Plan detailing steps Contractor will take to ensure a safe work environment.
 - 2☐ Contractor QA/QC Document to include bench testing / initial configuration of all critical system components including but not limited to:
 - a☐ System Server(s)
 - b☐ Cameras
 - c☐ Contractor Furnished Workstations (if applicable)
 - 3☐ Construction Schedule in a Gant chart format
 - 4☐ Contractor Cybersecurity Hardening Guide detailing Contractor's internal policies for preventing the introduction of cyberthreats to the Owner's technology / security infrastructure.
 - a☐ Contractor Certification Letter utilizing company letterhead detailing the company policies and procedures.
 - b☐ Contractor shall provide a cybersecurity plan detailing their internal policy for preventing the introduction of cyberthreats to the Owner's technology / security infrastructure.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. The following sections specifically list the acceptable equipment types and items for this project.
- B. All software, hardware, and equipment (from the date of RFP) shall be tested, currently available and commercially off the shelf product. (COTS).
- C. All wiring, equipment, and installation materials shall be Commercial Grade, new, and of the highest quality to meet or exceed the performance and features of the equipment and devices specified herein.
- D. Written approval must be obtained from the Architect / Design Consultant / Owner for any proprietary or custom software and/or equipment prior to the beginning of the project.
- E. All devices shall be installed with the manufacturer recommended mounts and accessories as necessary for the installation locations type as scheduled.
- F. Unless otherwise stated, all software and licensing shall be for the most current, up to date version of the system provided. For existing systems, Contractor shall obtain written verification of the Owner's most current software version and notify via RFI the Architect / Design Consultant / Owner if implementation of the most current software / license version will require an upgrade to the Owner's existing system.
- ☐. Architect / Design Consultant / Owner will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.
- ☐. Proposed equivalent items must be approved in writing by the Architect / Design Consultant / Owner prior to purchase or installation. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.

- I. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall submit a formal RFI for an appropriate substitute.
- J. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished at no additional cost to the owner.
 - For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.
 - Labels on all cabling, materials, and equipment must indicate a nationally recognized testing laboratory.
- M. Contractor shall review all products specified and required for this project to determine if there are any lead times for any products that may cause any delay. Contractor shall clearly identify any concerns with lead times in writing to the Architect / Design Consultant / Owner. If the Contractor does not identify any concerns with products having long lead times, it will be understood there are no long lead time issues and the Contractor will have all products on-site when needed to complete the job as per the project schedule.
- N. Any quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a fully functional turkey system. Where quantities are not noted, Contractor shall refer to drawings and schedules to determine exact quantities.

2.2 ACCEPTABLE MANUFACTURERS

- A. Electronic Surveillance System Software
 - 1. Video Insight
- B. Electronic Surveillance System Licensing
 - 1. Video Insight unlimited license per camera - (As required)
 - a. IPSVC-UL (Most Current Version)
- C. Electronic Surveillance System Server
 - 1. Network Virtual Centralized Server / Storage
 - a. Owner Furnished / Owner Installed (OFOI)
- D. Surveillance Cameras
 - 1. Interior 5 MP Dome with IR
 - a. i-PRO WV-S22500-V3L
 - b. Or approved equal
 - 1 Acceptable Mounts
 - a Wall Mount
 - (1) i-PRO WV-QWL500-W
 - b Adapter Box
 - (1) WV-QJB500-W
 - c Ceiling Tile Support
 - (1) Caddy – 512HD (By Div. 26)
 - (2) Double Gang Backbox (By Div.26)
 - (3) Dual Gang Mud Ring (By Div. 26)
 - 2. Interior 360 Degree Fisheye 5MP Camera
 - a. Panasonic WV-S4156
 - b. Or approved equal

- 1 Acceptable Mounts
 - a Wall Mount
 - (1) i-PRO WV-QWL500-W
 - (2) i-PRO PWM485W
 - b Adapter Box
 - (1) WV-QJB500-W
 - c Ceiling Tile Support
 - (1) Caddy – 512HD (By Div. 26)
 - (2) Double Gang Backbox (By Div.26)
 - (3) Dual Gang Mud Ring (By Div. 26)
 - 3. Exterior Fixed 5 MP (Indoor/Outdoor, Day/Night) Vandal Dome
 - a. i-PRO – WV-S25500-V3LN
 - b. Or approved equal
 - 1 Acceptable Mounts
 - a Mount
 - (1) i-PRO WV-QWL500-W
 - (2) i-PRO PWM485W
 - b Adapter Box
 - (1) WV-QJB500-W
 - 4. Exterior Multi-sensor Camera 33MP (4K x 4) w/ IR-LED (*Camera Manufacture's label / logo shall be installed with facing towards the center of main fields of views for best adjustment purposes. Coordinate proper mounting requirements with FBISD Security Manager*).
 - a. i-PRO – WV-S8574L
 - b. Or approved equal
 - 1 Acceptable Mounts
 - a Wall Mount
 - (1) i-PRO PWM40W
 - b Pendant Cap
 - (1) i-PRO WV-QSR503F1-W
 - c Pole Mount
 - (1) i-PRO PAPM4W
 - d Corner Mount
 - (1) i-PRO PACA4W
- E. Power Equipment
- 1. PoE Switch - (OFOI)
- F. Surge Protection
- 1. By Division 27 10 00
- Video Surveillance System Cabling

1. By Division 27 10 00
- . IP Cameras – Plenum rated - Orange Cable Jacket
- I. Pathway Cable Support
 1. Pathway Cable Support installed by others.
- J. Labeling
 1. Permanent Labels for Copper Cables
 2. Panduit Self-Laminating Labels
 3. Or approved equal.
- . Fire Stop
 1. STI Spec Seal
 2. 3M Products
 3. Or approved equal.

PART 3 - EXECUTION

3.1 CODES, STANDARDS, REGULATIONS

- A. American National Standards Institute (ANSI)
- B. American Society for Testing and Materials (ASTM)
 1. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire
 2. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
 3. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
 4. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials
- C. Alliance for Telecommunications Industry Solutions (ATIS)
- D. Building Industry Consulting Service International (BICSI)
 1. Telecommunications Distribution Methods Manual 13th Edition
 2. Outside Plant Design Reference Manual 5th Edition
 3. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices
 4. NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling
 5. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
- E. Federal Communications Commission (FCC)
 1. FCC Part 15, Radiated Emissions Limits, revised 1998
 2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998
 3. FCC Part 76, Cable Television Service, revised 1998
- F. Insulated Cable Design Consultants Association (ICEA)
 1. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable
 2. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors

3. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors
- . International Electrotechnical Commission (IEC)
- . Institute of Electrical and Electronics Design Consultants, Inc. (IEEE)
 1. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System
 2. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive
 3. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)
 4. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code
 5. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
- I. International Organization for Standardization (ISO)
 1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)
 2. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995
 3. ISO/IEC 14443-3:2011 – Identification Cards
 4. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999
- J. National Cable Television Association (NCTA)
- . National Electrical Contractors Association (NECA)
 1. NECA 1-2015 Good Workmanship in Electrical Construction
- . National Electrical Manufacturers Association (NEMA)
 1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits
- M. National Fire Protection Association (NFPA)
 1. NFPA-70, National Electrical Code
 2. NFPA-75, Protection of Electronic Computer Data Processing Equipment.
 3. NFPA-101, Life Safety Code
 4. NFPA-297, Guide on Principles and Practices for Telecommunications Systems
 5. NFPA-780, Standard for the Installation of Lightning Protection Systems.
- N. National Institute Standards and Technology (NIST)
- . Occupational Safety and Health Administration (OSHA)
- P. Security Industry Association (SIA)
- . Telecommunications Industry Association (TIA)
 1. ANSI/TIA-568.0-D-1, Generic Telecommunications Cabling for Customer Premises.
 2. ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard.
 3. ANSI/TIA -568.0-D.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
 4. ANSI/TIA-568.3-D-1, Optical Fiber Cabling Components Standard.
 5. ANSI/TIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
 6. ANSI/TIA-606-C, Administration Standard for the Telecommunications Infrastructure.

7. ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
8. ANSI/TIA-758-B, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- . U.S. Department of Agriculture (USDA)
 1. RUS 1755 Telecommunications Standards and Specifications for Materials, Equipment and Construction
 2. RUS Bull 1751F-643 (2002) Underground Plant Design
 3. RUS Bull 1751F-815 (1979) Electrical Protection of Outside Plant
 4. RUS Bull 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)
 5. RUS Bull 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)
 6. RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)
 7. RUS Bull 345-72 (1985) Filled Splice Closures (PE-74)
 8. RUS Bull 345-83 (1979; Rev Oct 1982) Gas Tube Surge Arrestors (PE-80)
- S. Underwriters Laboratories, Inc. (UL)
 1. UL 294 Standard for Video Surveillance System Units
 2. UL 294B Standard for Power Over Ethernet (PoE) Power Sources for Video Surveillance Systems and Equipment
 3. UL 109 Standard Method for Flame Tests of Flame-Resistant Fabrics and Films
 4. UL 1076 Standard for Proprietary Burglar Alarm Units and Systems

3.2 EXECUTION - GENERAL REQUIREMENTS

- A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of Texas, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect / Design Consultant for direction before proceeding with that part of the work.
- B. Contractor shall meet the specifications and standards from the latest NFPA and NEC publications. In the event of any conflicts between Standards and Codes the more stringent shall take precedence.
- C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines. Equipment and materials installed by the Contractor shall be free of defects and damage.
- D. No deviations from the plans, details or specifications shall be made without full consent in writing of the Architect / Design Consultant. The Contractor shall have written approval from the Architect / Design Consultant for any additional work beyond the Contract Documents prior to beginning such work.
- E. Prior to execution, Contractor shall verify no changes in software, licensing or hardware versions have occurred since the bidding of the project. In the event of any changes, Contractor shall verify system compatibilities with their proposed design, and notify via RFI the Architect / Design Consultant / Owner if the newest version(s) will require any upgrades / additional costs to the existing system(s).
- F. In the event site conditions do not allow the contractor to follow the execution requirements specified herein or in the provided details, the Contractor shall submit via RFI an alternative means and methods that is approved in writing by the Architect / Design Consultant / Owner.
- . The Contractor shall obtain written permission from the Architect / Design Consultant / Owner before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to: girders, beams, floors, walls, roofs, and/or ceilings.

- . If the Contractor does not obtain written approval from the Architect / Design Consultant / Owner prior to proceeding with the work, the contractor shall not be reimbursed for the work.
- I. Contractor shall notify the Architect / Design Consultant / Owner a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect / Design Consultant / Owner to perform a walkthrough, review the scope of work, schedule, and escalation procedures.
- J. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.
 - . Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.
 - . Contractor shall test all cables prior to and post installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.
- M. Contractor shall maintain a set of working specifications, design drawings, schedules, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect / Design Consultant / Owner.
- N. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.
 - . Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.
- P. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect / Design Consultant / Owner.
 - . All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.
 - . All devices shall be installed flush, plumb, and (where required) centered on the wall, ceiling tile or structure for which it is being installed, unless otherwise noted.
- S. Devices installed in public spaces shall be mounted and secured using tamper-proof security fasteners unless otherwise noted.
- T. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.
 - . Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.
 - . Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.
 - . The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.
 - . The manufacturer and contractor shall take positive measures to prevent the introduction of cybersecurity threats to the Owners technology infrastructure. These measures shall include but are not limited to:
 1. The contractor shall scan contractor owned equipment for cyber threats such as viruses, malware, ransomware, etc., prior to connecting the contractor owned devices to the Owners network.
 2. Ensure all technicians installing or configuring equipment are trained on the prevention of introduction of cyber threats to electronics, i.e., servers, and other associated equipment.
 3. All project documents shall be properly securely stored behind encryption and password protection to avoid unauthorized distribution of documents.
 - . All security system cabling shall be orange in color.

- All security system cabling shall be plenum rated.
 - 1. All security system cabling shall be installed following the same pathway and support requirements as the Division 27 Communications.

3.3 COORDINATION REQUIREMENTS

- A. The Contractor is responsible for the coordination of the following items and their respective disciplines included but not limited to.
- B. Coordinate with the Architect to ensure that:
 - 1. Adequate conduit is provided and that equipment backboxes are adequate for system installation.
 - 2. Adequate communication infrastructure and power has been provided and properly located for the security system equipment.
 - 3. Finishes and colors of all equipment visibly installed in public areas. Submit all finish and graphics for all equipment to the Architect for approval prior to installation.
 - 4. Camera views are not obstructed by landscaping, awnings, or any other obstacles.
 - 5. Mounting techniques are in compliance with construction techniques.
 - 6. Camera location and field of views are adequate and meets Owner's expectations.
- C. Coordinate with the Division 26 contractor for the following:
 - 1. Power requirements, conduit sizes/pathways, sleeves, back boxes, grounding, and bonding requirements of security devices in the following locations:
 - a. Interior of the building
 - b. Exterior of the building
 - c. Pole, pedestals, canopies, awnings, building architectural surface, etc.
 - d. Special conditions (clean room, hazardous areas, roof top mounted devices, etc.).
 - e. License Plate Recognition (LPR) exact camera placement requirements.
 - 2. Coordinate location and termination of earth ground for all device specified herein as required per manufacturer installation requirements.
- D. Coordinate with the Division 27 contractor for the following:
 - 1. Installation and power requirements of network infrastructure associated to the specified system.
 - 2. Associated patch cable lengths and quantities required for the specified system.
 - 3. Location, power, and backup requirements for rack mount equipment.
 - 4. Mounting and installation of injectors, midspans, extenders, surge protectors, etc.
- E. The Contractor is responsible for coordinating all VMS programming requirements with the Owner / Architect / Design Consultant.
- F. The Contractor shall coordinate with the Owner prior to installation for the following:
 - 1. Network IP addressing for networked system equipment, servers, and devices.
 - 2. Device labeling scheme
 - 3. Firmware/software updates
 - 4. Client workstations requirements and locations
 - 5. Location of rack mount equipment.
 - 6. Locations, type, programming, configuration, and Owner's final expectations for any Contractor Furnished Contractor Installed (CFCI) equipment and devices.

7. Uninterruptible Power Supply (UPS) requirements.
8. Painting of exposed, publicly visible conduit pathways
9. Camera Views (Owner's Written Acceptance Required)

3.4 SYSTEM REQUIREMENTS

A. General

1. The Video Surveillance System (VMS) shall consist of server(s), software, licensing, workstations, cameras, power source, grounding/bonding, Video Surveillance cabling, and all other peripheral components as indicated on the drawing and specified herein.
2. Any devices associated with the installation shall have the latest firmware updates downloads via Owner approved secure link from the system software and/or remotely from the manufacturer.
3. All Video Surveillance software, equipment and system requirements shall be installed per their respective Manufacturer Installation Guidelines.
4. All programming and configuration of the Video Surveillance Systems shall be accomplished by the Security Contractor.
 - a. The Security Contractor is responsible for all Video Surveillance System (VSS) programming to ensure the installed field devices, cameras, servers, workstations, media converters, etc., are communicating to the head-end equipment.

B. System Configuration:

1. Camera recording and display configurations shall be arranged during the provisioning phase, based on coordination with Owner and the specifications.
2. Contractor shall coordinate with Owner to determine the required pre-programmed surveillance and event-initiated configurations.

C. Graphical User Interface (GUI) Environment

1. General

- a. Security Contractor shall create and provide maps for each site and building, and for each floor of the building where VSS devices are provided.
- b. The VSS client shall display color graphic maps, menus and real-time information regarding system configuration, camera location and status, in graphical format, as required by Owner and described herein. Contractor shall research icon usage and use same icons through the system.

2. Map Database: Contractor shall research (with Owner), design, develop and provide site and building maps described herein in complete operating condition including graphic representations, icons, alarm and control interfaces.

- a. Individual Site Plans: Individual site plan maps shall include the entire site perimeter showing buildings, vehicle and foot traffic features and street frontage. Individual site plans may contain multiple buildings. Large-scale maps shall have dynamic zoom or designated "hot spot" areas to allow the capability to zoom into an area down to 1/8" scale. Site plans shall have icons for exterior mounted devices and entry/exit portals.
- b. Building Maps: Building Maps shall include the building footprint and surrounding areas, ground floor plan, a floor stacking plan (elevation) and stairwell risers. Building plans shall have icons for exterior mounted devices and entry/exit portals.
- c. Floor Plan Maps: Floor plan maps shall include rooms, corridors, elevators, door and room designations (number and usage), penetrable wall points, column supports, location of access control equipment and any other details necessary to clearly and completely depict the secured environment.
- d. Device Icons:

- Individual site plans, building plans, and floor plan maps shall show text and icons for devices monitored and/or controlled by the DVMS.
 - The maps shall include active icons for video cameras allowing distinction between types, whose individual selection shall be supported via the GUI using the integration schemes described in the specifications.
- D. VSS Connectivity
- 1. Owner Provided Network: Owner shall provide the network infrastructure for security systems, including backbone cabling, routers, network switches, and miscellaneous devices necessary to support and protect the security systems.
 - 2. The Contractor shall coordinate with the IT department and provide IT with detailed network requirements including but not limited to
 - a. Location and quantity of ports needed by network appliances
 - b. Bandwidth and throughput requirements at key locations
 - c. Coordinate IP and MAC addresses required by network appliances
 - d. Other information as necessary to establish communications and security protection for security systems and devices
 - 3. VSS Network: Base Servers, Network Video Recorders, and Client Workstations shall reside on Owners' Local Area (LAN) and/or Wide Area Network (WAN) to allow global activity and shared data interchange.
 - 4. Coordinate with the District's IT department to determine adequate network "firewalls" to maintain the security of VSS controls and information while connected to shared computer networks and transmission media.
- E. Video Surveillance System (VMS) Software
- 1. Server/Client/Workstation/Mobile Application Software
 - a. The VMS software shall be installed as the most current version; contractor shall coordinate with Owner prior to the upgrade/install to identify and evaluate any software conflicts. Conflicts shall be brought to the attention of the Architect/Design Consultant prior to installation via written Request for Information (RFI). Contractor shall coordinate the install and configure software as required to provide a full turnkey VMS.
- F. Video Surveillance System Licensing
- 1. Contractor shall be responsible for providing and applying all necessary licensing key(s) for the specified system(s) as required by the manufacturer(s) for a fully functioning Video Surveillance System.
 - 2. Contractor shall maintain a secured document with all license key(s) information applicable to this project. All license key(s) are property of the Owner and shall be kept secured at all times and then surrendered to the Owner at the end of the project.
- Video Surveillance System Hardware
- 1. Video Surveillance Virtual Central Server
 - a. OFOI
 - Communications
 - a Communication between servers, workstations, and networked based edge devices will communicate using the Owner provided data network unless otherwise noted. Coordinate with Owner for network configuration requirements.
 - 2. Video Surveillance Workstations

- a. OFOI
- 3. Surveillance Cameras
 - a. The Contractor shall have all on-site equipment, and personnel necessary to install, program, and troubleshoot devices during and after installation.
 - b. Unless otherwise stated, all cameras shall receive power through Power over Ethernet. Contractor is responsible for ensuring the power output of the network switch will meet the power requirements of the cameras to be installed. Any additional power will be the responsibility of the contractor to provide.
 - c. The Contractor shall energize and commission equipment in accordance with manufacturer's instructions and guidelines. All installed cameras, mounts, accessories, and fasteners shall be properly rated for the environmental conditions in which they will be installed. Contractor is responsible for sealing and making watertight all exterior penetrations and equipment.
 - d. The Contractor is responsible for all the initial configuration of camera settings, IP address settings, recording settings, presets, naming conventions, etc. unless otherwise noted.
 - e. Default admin account usernames and passwords shall be reconfigured prior to connecting to the Owner's network. New admin accounts and passwords shall be Owner Provided. Account passwords and settings shall be held in confidence by the Contractor and secured throughout the duration of the project to prevent unauthorized access.
 - f. As part of initial installation, Contractor is responsible for focusing and aiming the camera in the direction as indicated in the drawings. Unless otherwise stated, camera lenses shall provide the maximum field of view coverage to the area to provide a usable, level, clear image, pending Owner's final approval. Contractor shall plan for a minimum of one additional trip to make final adjustments of camera field of views.
- 4. Surge Protection / Lightning Arrestors
 - a. Shall be provided by Division 27 10 00
 - b. Protect all exterior or interior devices, control, power, signal cables and conductors that are power surges. Each surge protector shall be UL Listed.
 - c. Unless otherwise noted, surge protection devices shall be installed at both the edge and head end of the cabling run.
 - d. Surge devices shall be installed as close as accessibly possible to the equipment they are protecting.
 - e. Surge Protection shall be properly installed in an accessible ceiling or enclosure space to allow for cable removal during troubleshooting.
 - f. Include surge protection device locations on as-builts and shop drawings.
 - Provide protection against spikes, surges, noise, and other line problems for all system equipment and components.
 - h. Properly ground surge protection devices per the manufacturer installation requirements.
- Video Surveillance Cabling
 - 1. Unless otherwise noted, all data cabling from end to end to support the Video Surveillance System and all related IP devices shall be provided, installed, and maintained by Div. 27 10 00/ the Owner.
 - a. Alternative communications means and methods shall be provided by Division 27/28 where applicable, including but not limited to:
 - 1 PoE over Fiber
- I. Device Labeling

1. Unless otherwise, all installed devices shall be labeled. Contractor shall verify device numbering scheme and Owner's current naming convention standard in writing in advance via RFI prior to generating any labels.
 2. Unless otherwise stated, all labels shall be machine printed and adhered to the device in a location that is visible and legible to the naked eye.
 3. All labeling in the field shall match the same labeling scheme in the closeout documents.
 4. Refer to Div. 27 specifications for data network device cabling requirements.
- J. Grounding and Bonding
1. All grounding and bonding shall be performed by a licensed electrical contractor to ensure the electrical integrity of the low voltage system and devices specified herein per federal / state / local codes and standards.
 2. Contractor shall notify the Architect / Owner / Design Consultant via written RFI of any site conditions or installations that will require additional coordination.
 3. Contractor shall ensure proper grounding of shielded or non-shielded cabling and devices conform to the specified devices manufacturer's installation guidelines.
 4. The Division 28 Contractor is responsible for coordinating with the Division 26 Contractor for grounding and bonding security devices per applicable codes and standards.
- . Conduit, Boxes and Raceways (For Reference Only - By Division 26)
1. Install all conduit necessary for a complete installation but not limited to: in finished areas, in concealed areas, in chases, in furring's, in concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.
 2. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, industry-standard installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets, or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.
 3. All conduits shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.
 4. All required inserts shall be drilled-in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.
 5. Swab out and remove all burrs from conduit before any wires are pulled.
 6. Lay out and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the covering of the pipe crossed.
 7. Provide fire stops where conduits penetrate fire rated walls and/or floors.
 8. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Architect.

3.5 TESTING REQUIREMENTS

- A. The Contractor shall perform a burn-in of the system that is in accordance with the manufacturer's installation guidelines.
1. All devices shall be powered up and tested in a phased approach in a controlled testing environment on or off premise (to be coordinated with the Owner).
 2. Update firmware with most up to date version (to be coordinated with the Owner).

- B. Contractor shall conduct a five (5) day burn in test. Each system hardware device shall remain operational during the burn-in test for a minimum of eight (8) hours without failure.
 - 1. Contractor shall provide successful burn-in results in writing to the Architect / Design Consultant prior to final acceptance.
- C. Security Contractor shall conduct a complete QA/QC test of the entire system and provide a written report of the test results (Punchlist). The tests shall include, but not limited to:
 - 1. Hardware
 - 2. Software
 - 3. Network Connectivity
 - 4. Device Power
 - 5. Configure system device settings
 - 6. Setting camera views (aim & focus)
 - 7. Archiving of video footage
- D. It is the responsibility of the Contractor to verify that all devices, equipment, software, interfaces, sub-system interfaces and integrations are fully functional and operational.
- E. Contractor shall rectify all issues discovered during the QA/QC process and shall document these corrections via a Contractor provided punch-list.
 - 1. At a minimum, the punch-list shall contain:
 - a. Date of the item identified
 - b. Description of the discrepancy with photographs, as necessary.
 - c. Date the item was rectified
- F. All QA/QC items shall be corrected, and an electronic report surrendered to the Architect / Design Consultant prior to calling for Substantial Completion.

3.6 TRAINING REQUIREMENTS

- A. Training outline with Owner sign off specific to the vertical market served.
- B. Provide for (4) hours of training for two (2) persons on each system.
- C. The Contractor shall closely coordinate with the Owner to establish a training syllabus and schedule. Submit a comprehensive training curriculum to the Owner once all preliminary coordination is complete. The Owner will revise and comment on the curriculum as required.
- D. Contractor training shall be conducted onsite/virtually. Training shall be conducted by a Factory Certified trainer from the Manufacturer.
- E. Operator training shall be structured to provide the appropriate users the information required for them to be able to perform the following tasks:
 - 1. All operating procedures
 - 2. System configuration
 - 3. Camera Configuration
 - 4. Rules Configuration
 - 5. Alarm acknowledgement, alarm response logging, and map graphics functionality
 - 6. Manipulation of cameras and presets.
 - 7. Archiving Recorded Video

- F. Administrative training shall include, but not be limited to the following:
 - 1. All operating system procedures, configuration variables and graphic user interface (GUI)
 - 2. Report generation
- . Record, label, and catalog all training on DVD and “user’s manual” written specifically for the Owner personnel onsite, for daily routine operations of the systems. Provide the DVD and user’s manual to the Owner for future in-house training sessions and / or reviews. Furnish all temporary equipment necessary for recording all training sessions. Maintain accurate and up-to-date time sheets of all training sessions.
- . The Owner reserves the right to use any excess training hours, not used by the time of system completion, for future training as requested until the total number of training hours has been completed.

3.7 FIELD OBSERVATIONS

- A. A minimum of ten business days in advance, Contractor shall notify the Design Consultant and Owner as to the readiness for a Field Observation for the following at a minimum but not limited to:
 - 1. Rough-In Observation – after conduits have been installed, but before walls have been installed.
 - 2. Above Ceiling Observation – after cabling has been installed, but before ceilings have been installed.
 - 3. Final Site Observation – a minimum of two weeks before Substantial Completion.
- B. During Design Consultant’s Final Site Observation of the installed systems, provide a minimum of one factory-trained/certified technician on the operation of all installed systems for up to (1) 8-hour day to assist with Design Consultant’s functional testing.
- C. Non-Conforming Work (Punch-List)
 - 1. After receipt of written notice of deficiencies (Punch-List), Contractor shall correct all defective work within ten business days. If the work has been identified to be corrected by the Architect/Design Consultant, the Contractor shall remediate it in conformance with the contract documents at no cost to the Owner.

3.8 SUBSTANTIAL COMPLETION

- A. It is the responsibility of the Contractor to ensure that all punch list items are 100% complete. The Contractor shall complete an internal Quality Assurance / Quality Control inspection, make all corrections, document the deficiencies and corrections prior to requesting for any further inspections with the Architect / Owner / Design Consultant.
- B. Prior to any Substantial Completion, the Contractor shall submit a minimum two sets of preliminary (first draft) Record Drawings (As-Builts) to the Architect/Design Consultant. The preliminary Record Drawings are to be used by the Architect/Design Consultant to conduct the system substantial completion inspection.
- C. The Contractor shall notify the General Contractor / Architect / Design Consultant that all the items noted above have been completed and the installation is ready for inspection.
- D. The Architect / Design Consultant shall schedule an inspection of the installation with the General Contractor and the Installing Contractor(s) present.
- E. The Substantial Completion Inspection shall consist of the following:
 - 1. The Project Manager/Superintendent and Installation Technician shall be on site with all tools, materials, and equipment ready to resolve any minor issues identified.
 - 2. The Design Consultant or designated representative shall visually inspect the installation in accordance with the official design documents.
 - a. The Contractor shall be prepared to remove and reinstall (minimum 10%) randomly selected security devices to inspect the mounting, cabling, terminations, connectors, labeling, tampers.
 - 3. Punch list items shall be identified and documented in a provided punch list with a date and description of the issue found, and a date the discrepancy was addressed and the resolution.

- F. Provide all personnel, equipment, and supplies necessary to perform all site testing. All video surveillance cameras shall be pointed and aimed in the views as shown in the drawings and using best practices. Contractor shall provide a minimum two employees to verify all cameras have been pointed and aimed to achieve Owner final approval. A manufacturer's representative may be present on site to answer any questions that may be beyond the technical capability of the Contractor's employees, if the Contractor so elects or by specific request of the Architect or Owner, at no charge to the Architect or Owner.
- The Contractor shall coordinate with the Architect/Design Consultant on security related construction clean-up and patch work requirements. Security equipment closets and similar areas should be free of accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, remove all waste materials, rubbish, the Contractor's and its subcontractors' tools, construction equipment, machinery, and all surplus materials.
- At their discretion, if the Design Consultant or their designated representative deems the site not ready for inspection/observation, the inspection will be cancelled. The Contractor(s) shall immediately address all issues identified, and shall reschedule the inspection in a timely manner so as not to affect the overall construction schedule.
- I. Adjustments and Documentation: energizing and testing the systems, make adjustments and document the setting of controls, configurations, as applicable. Tabulate all data along with an inventory of test equipment, a description of testing conditions and a list of test personnel.
- J. Test Documentation: Create and provide complete test reports documenting the results of the each performed on each device, control panel, power supply, and other elements of the system. Copies of preliminary test data shall accompany copies of performance testing data as part of the Operating and Maintenance submittal.

3.9 PROJECT CLOSEOUT DOCUMENTATION

A. As-Built Drawings

- 1. Drawings shall be provided to the Architect / Owner / Design Consultant at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect / Owner / Design Consultant.
- 2. Unless otherwise requested, Contractor shall provide digital copies of close-out documents, and deliver to the Architect / Owner / Design Consultant electronically.
- 3. As-Built drawings shall be produced in AutoCAD/Revit in the most current or compatible version and provided electronically in .dwg and/or .pdf format.
- 4. Drawings shall be provided in the original size as issued by the Architect/Design Consultant.
- 5. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect/Design Consultant.
- 6. Provide a conformed set of Drawings as related to the project, depicting the condition of the Video Surveillance system as installed to include but not limited to:
 - a. ASI, PR, and Addendum items installed throughout the duration of the project.
- 7. Provide a hard copy of the conformed set of drawings to be physically stored at the end of the project in a designated Video Surveillance System enclosure. Coordinate with Owner for final storage location.
- 8. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of the following not limited to:
 - a. Video Surveillance System Riser / Signal Flow Diagrams
 - b. Video Surveillance System Backboard Layouts
 - To include Video Surveillance boards, power supplies, pathways, etc.
 - c. Sleeves, Backbone Cabling and Communication pathways
 - d. Video Surveillance System device locations and labeling scheme.

9. **As-builts shall include each MAC Address clearly labeled next to each IP device it's associated with, IE. each camera and intelligent controller.**
- B. Operation & Maintenance Manuals
 1. Unless otherwise noted, provide O&M manuals electronically to Owner to include all drawings, product datasheets, hardware manuals as related to the project.
 2. Coordinate with the Owner for provisioning of physical storage devices (Hardcopy, Flash Drive, CD/DVDs)
- C. Manufacturer's Product Warranty
 1. Certificate of product warranty shall be provided to the Architect / Owner / Design Consultant at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Architect/Design Consultant.
 2. The manufacturer of the solution shall furnish a product warranty as per the specifications starting at final system acceptance.
 3. One original and two copies of the Manufacturer's product warranty shall be provided.
- D. Contactor's Statement of Warranty
 1. Statement of warranty shall be provided to the Architect/Design Consultant at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect/Design Consultant.
 2. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor and workmanship starting at final system acceptance.
 3. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e., Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.

END OF SECTION 28 23 00

SECTION 28 31 11 - DIGITAL, ADDRESSABLE, VOICE EVACUATION FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit (existing).
 - 2. Manual fire-alarm boxes.
 - 3. System smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Notification appliances.
 - 6. Device guards.
 - 7. Magnetic door holders.
 - 8. Remote annunciator (existing).
- B. This section includes upgrades and expansion of the existing addressable fire-alarm system in the building. The new renovation will be provided with new appliances and devices to provide voice evacuation capabilities as an extension of the existing fire-alarm system in the building.
- C. The existing fire alarm panel is a Silent Knight by Honeywell panel.
- D. Related Sections include the following:
 - 1. Division 26 Section "Raceways and Boxes for Electrical Systems" for raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.02 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

1.03 SYSTEM DESCRIPTION

- A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and speaker/strobe evacuation, dedicated to fire-alarm service only.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.04 ACTION SUBMITTALS

- A. Submit product data and shop drawings in accordance with Division 01 and Division 28 Section "Electronic Safety and Security Shop Drawings and Submittals" for products specified under PART 2 - PRODUCTS.
- B. Specification Compliance Certification: Submit a Specification Compliance Certification in accordance with Division 28 Section "Electronic Safety and Security Shop Drawings and Submittals".
- C. Product Data: For each type of product, including furnished options and accessories.
 - 1. Include construction details, material descriptions, dimensions, profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, and electrical characteristics.
- D. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
 - 4. Detail assembly and support requirements.
 - 5. Include voltage drop calculations for notification-appliance circuits.
 - 6. Include battery-size calculations.
 - 7. Include input/output matrix.
 - 8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - 9. Include performance parameters and installation details for each detector.

10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 11. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
 - a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
 - b. Show field wiring required for HVAC unit shutdown on alarm.
 - c. Locate detectors according to manufacturer's written recommendations.
 12. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
 13. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- E. General Submittal Requirements:
1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.
 - c. Licensed or certified by authorities having jurisdiction.
- F. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
 2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
 3. Indicate audible appliances required to produce square wave signal per NFPA 72.
- 1.05 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
 - B. Field quality-control reports.
 - C. Sample Warranty: For special warranty.
- 1.06 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
 1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 - d. Riser diagram.
 - e. Device addresses.
 - f. Record copy of site-specific software.
 - g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
 - 1) Equipment tested.
 - 2) Frequency of testing of installed components.
 - 3) Frequency of inspection of installed components.
 - 4) Requirements and recommendations related to results of maintenance.
 - 5) Manufacturer's user training manuals.
 - h. Manufacturer's required maintenance related to system warranty requirements.
 - i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.
 - B. Software and Firmware Operational Documentation:
 1. Software operating and upgrade manuals.
 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 3. Device address list.
 4. Printout of software application and graphic screens.

1.07 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps for Remote Indicating Lamp Units: Quantity equal to 5 percent of amount installed, but no fewer than one unit.
 - 2. Lamps for Strobe Units: Quantity equal to 5 percent of amount installed, but no fewer than one unit.
 - 3. Smoke Detectors, Fire Detectors: Quantity equal to 5 percent of amount of each type installed, but no fewer than one unit of each type.
 - 4. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
 - 5. Keys and Tools: One extra set for access to locked or tamper-proofed components.
 - 6. Audible and Visual Notification Appliances: One of each type installed.
 - 7. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level IV technician.
- C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.09 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.
- D. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, elevators, HVAC systems, and security/door locking systems.

1.10 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:
 - 1. Manual stations.
 - 2. Smoke detectors.
 - 3. Duct smoke detectors.
 - 4. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Identify alarm and specific initiating device addressable point at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
 - 2. Sound a distinctive evacuation signal throughout the entire building where specific initiating device is in alarm.
 - 3. Simultaneously active all flashing visual alarm assemblies associated with audible indicators.

4. Unlock electric door locks in designated egress paths.
 5. Release fire and smoke doors held open by magnetic door holders.
 6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode. Shut down HVAC equipment rated 2000 cfm or greater that circulate air on the alarm floor.
 7. Activate an automatic telephone dialer and alarm contact closure for use with approved central station monitoring service. Owner provides NFPA 71 central station connection and maintains that service.
 8. Record events in the system memory.
 9. Indicate device in alarm on the graphic annunciator.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
1. Valve supervisory switch.
 2. Alert and Action signals of air-sampling detector system.
 3. Independent fire-detection and -suppression systems.
 4. User disabling of zones or individual devices.
 5. Loss of communication with any panel on the network.
- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
 4. Loss of primary power at fire-alarm control unit.
 5. Ground or a single break in internal circuits of fire-alarm control unit.
 6. Abnormal ac voltage at fire-alarm control unit.
 7. Break in standby battery circuitry.
 8. Failure of battery charging.
 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
 10. Voice signal amplifier failure.
- E. System Supervisory Signal Actions:
1. Initiate notification appliances.
 2. Identify specific device addressable point initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
 3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
 4. Transmit system status to building management system.
 5. Display system status on graphic annunciator.
- 2.02 FIRE-ALARM CONTROL UNIT
- A. General Requirements for Fire-Alarm Control Unit (Existing Unit):
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
 - a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 - d. The FACP shall be listed for connection to a central-station signaling system service.
 - e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
 2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
 3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, three line(s) of 80 characters, minimum.
 2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.
- C. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:
1. Pathway Class Designations: NFPA 72, Class A.
 2. Pathway Survivability: Level 1.

3. Each Signaling Line Circuit (SLC) and Notification Appliance Circuit (NAC): Limited to only 80 percent of its total capacity during initial installation.
4. Serial Interfaces:
 - a. One dedicated RS 485 port for central-station operation using point ID DACT.
 - b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
 - c. One RS 232 port for PC configuration.
 - d. One RS 232 port for voice evacuation interface.
- D. Smoke-Alarm Verification:
 1. Provide UL-Listed alarm verification feature.
 2. Alarm verification shall be per addressable, open area smoke detector. Alarm verification shall be field programmable on an individual detector basis.
 3. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 4. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector as prescribed by UL 864.
 5. The system shall reset the alarmed zone/device within the UL prescribed window of 60 seconds maximum. If the alarm condition does not confirm with 60 seconds of the reset signal, the programmed alarm outputs shall be canceled and the system returned to the normal mode.
 6. If the alarm condition re-occurs within the designated verification cycle or a non-verified device or zone activates, the programmed events listed above shall immediately occur for the confirmed alarm condition.
 7. Sound general alarm if the alarm is verified.
 8. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
- E. Notification-Appliance Circuit:
 1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72, followed by pre-recorded message determined by event and this scenario repeating or other message as approved by local authority until system is reset.
 2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
- F. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.
- G. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory.
- H. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- I. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.
 1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.
 - a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
 - b. Programmable tone and message sequence selection.
 - c. Standard digitally recorded messages for "Evacuation" and "All Clear."
 - 1) Fire evacuation and relocation.
 - 2) Intruder or hostile person sighted within or around the building grounds.
 - 3) Directions to occupants to take cover within building.
 - 4) Emergency weather conditions appropriate for local area.
 - 5) All clear.
 - d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
 2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
- J. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.
 1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

- K. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - 1. Batteries: Sealed lead calcium.
 - 2. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.
 - L. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.
- 2.03 MANUAL FIRE-ALARM BOXES
- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - 1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with attached addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - 2. Station Reset: Key- or wrench-operated switch.
 - 3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
- 2.04 SYSTEM SMOKE DETECTORS
- A. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall be two-wire type.
 - 3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 5. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - 6. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - a. Multiple levels of detection sensitivity for each sensor.
 - b. Sensitivity levels based on time of day.
 - B. Photoelectric Smoke Detectors:
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 - C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 - 3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
 - 4. Each sensor shall have multiple levels of detection sensitivity.
 - 5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - 6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.05 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- B. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch-high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. Mounting: Ceiling mounted unless otherwise indicated.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
 - 6. Mounting Faceplate: Factory finished, white.
- C. Voice/Tone Notification Appliances:
 - 1. Comply with UL 1480.
 - 2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
 - 3. High-Range Units: Rated 2 to 15 W.
 - 4. Low-Range Units: Rated 1 to 2 W.
 - 5. Mounting: Flush or surface mounted and bidirectional.
 - 6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.06 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
 - 1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
 - 2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
 - 3. Rating: 24-V ac or dc.
 - 4. Rating: 120-V ac.
- B. Material and Finish: Match door hardware.

2.07 DEVICE GUARDS

- A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - 1. Factory fabricated and furnished by device manufacturer.
 - 2. Finish: Paint of color to match the protected device.
- B. Provide STI Stopper II Cover with integral sounder on all manual pull stations.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Connect new equipment to existing monitoring equipment at the supervising station.
 - 3. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

- C. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.
 - D. Manual Fire-Alarm Boxes:
 - 1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
 - 2. Mount manual fire-alarm box on a background of a contrasting color.
 - 3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.
 - 4. Provide Stopper II covers with integral sounders on all manual stations except the manual station installed directly adjacent to the fire alarm control panel.
 - E. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
 - 3. Smooth ceiling spacing shall not exceed 30 feet.
 - 4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
 - 5. HVAC: Locate detectors not closer than 36 inches from air-supply diffuser or return-air opening.
 - 6. Lighting Fixtures: Locate detectors not closer than 12 inches from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
 - F. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
 - G. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
 - H. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
 - I. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
 - J. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.
 - K. Device Location-Indicating Lights: Locate in public space near the device they monitor.
- 3.03 DELIVERY, STORAGE, AND HANDLING
- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 - B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
 - C. Handling: Protect materials from damage during handling and installation.
- 3.04 PATHWAYS
- A. Pathways above recessed ceilings and in non-accessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches above the floor shall be installed in EMT.
 - B. Pathways shall be installed in EMT.
 - C. Exposed EMT shall be painted red enamel.
- 3.05 CONNECTIONS
- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.
 - 1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.
 - B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.
 - 2. Magnetically held-open doors.
 - 3. Electronically locked doors and access gates.
 - 4. Alarm-initiating connection to elevator recall system and components.
 - 5. Supervisory connections at valve supervisory switches.
 - 6. Supervisory connections at elevator shunt-trip breaker.
 - 7. Data communication circuits for connection to building management system.

- 3.06 IDENTIFICATION
- A. Install framed instructions in a location visible from fire-alarm control unit.
 - B. All junction boxes including the cover are to be painted red in color for identification purposes.
 - C. All control panels and sub panels shall clearly indicate electrical breaker location, including room number, panel name, and breaker number.
 - D. Provide self-adhesive, color-coded, identification marker on ceiling grid directly below any device requiring an IP-connection or service above the ceiling. Ceiling marker to be Seton L12723 or equivalent. Fire alarm related devices should utilize a red identification marker on the ceiling grid.
 - E. Identify each initiating device or signaling appliance with loop and circuit number. Use clear self-adhesive label with black lettering on face or mounting base of device.
- 3.07 GROUNDING
- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
 - B. Ground shielded cables at the control panel location only. Insulate shield at device location.
- 3.08 FIELD QUALITY CONTROL
- A. Field tests shall be witnessed by authorities having jurisdiction.
 - B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
 - C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 1. Visual Inspection: Conduct visual inspection prior to testing.
 - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
 - E. Fire-alarm system will be considered defective if it does not pass tests and inspections.
 - F. Prepare test and inspection reports.
 - G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
 - H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.
- 3.09 MAINTENANCE SERVICE
- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- 3.10 SOFTWARE SERVICE AGREEMENT
- A. Comply with UL 864.
 - B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
 - C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

- D. Installer shall provide a backup copy of the installed program database on USB drive upon completion of the project. They shall also provide the current version for the panel provided.

END OF SECTION 28 31 11

SECTION 31 11 00 – CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This section pertains to the specifications for clearing and grubbing, topsoil removal and stockpiling, disconnecting, capping or sealing, and abandoning site utilities in place, and disposal of all vegetation, rubbish and excess material, as required for site grading and related staging areas as noted on the drawings and in accordance with these specifications.

1.02 DEFINITIONS

- A. Topsoil: Soil with organic content suitable for sustaining the growth of a soil stabilizing groundcover such as turf. Topsoil is spread over prepared subgrade.
 - 1. Stockpiled Native Topsoil: Topsoil stripped from the site prior to rough grading work to be spread and amended as required. No onsite soil may be used as topsoil unless approved by Landscape Architect. Soil cut from non-organic layers will not be considered for use as topsoil.
 - 2. Imported Landscape Topsoil: Off-site topsoil imported and stockpiled to be spread and amended as specified.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.
- C. Subgrade: The uppermost surface of an excavation, including excavation for trenches, or the top surface of a fill or backfill immediately below base course, pavement, or topsoil materials.
- D. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Owner's representative. Unauthorized excavation, as well as remedial work directed by the Owner's Rep shall be at the Contractor's expense.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.
- B. Coordinate clearing work with utility companies.
- C. Prior to commencement of work, the Contractor shall be responsible for obtaining, at the contractor's own expense, all construction permits necessary to complete the project according to the plans and specifications.

1.04 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.05 PROJECT CONDITIONS

- A. Subsurface data is available from the Owner. Contractor is urged to carefully analyze the site conditions.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-preparation operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Salvable Improvements: Carefully remove items indicated on drawings to be salvaged and store on Owner's premises where indicated. Contractor to contact Owner's representative for coordination.
- D. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place
- E. Protection of Existing Utilities:
 - 1. Existence and location of underground items are not guaranteed. Investigate and field verify before starting work. Excavation and backfill in the vicinity of existing items of work shall be carried out with extreme caution.
 - 2. Utility Locator Service: Notify Texas 811 before site clearing.
 - 3. Contractor shall be held responsible for any damage and for maintenance and protection of existing utilities.
 - 4. Indicate on record drawings where there is conflict between field conditions and drawings.
- F. Staging Areas - Approval must be obtained from the Owner to use any area for staging that is not specifically identified as such on the plans. The Contractor shall restore all areas used for staging, the extent of said restoration to be defined by the Owner upon granting approval for the use of said area for staging.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 PREPERATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated
- D. Control dust and noise, perform work in accordance with requirement of authorities having jurisdiction. No explosives are permitted. No on-site burning is permitted.

3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures per Section 01 57 13 – Erosion and Sedimentation Controls.
- B. Provide measures according to a sediment and erosion control plan, specific to the site, which complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
- C. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.03 TREE PROTECTION

- A. Erect and maintain temporary fencing around Tree Protection Zones (TPZ) before starting site clearing. TPZ is 1.50 feet away in radial distance from the trunk for every inch in stem diameter. Remove fence when construction is complete.
- B. Do not excavate within Tree Protection Zones, unless otherwise indicated.
- C. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

3.04 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Arrange with utility companies to shut off indicated utilities. Contractor is responsible for any service charge required for shut-off action. If other outstanding fees or billings are encountered, the Contractor shall notify the Owner's representative for direction.
- B. Known utilities are shown on drawings. If utilities are discovered that are not shown on the drawings, contact Owner's representative for direction. Do not interrupt unknown utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner's representative not less than two weeks in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without the authorization of the authority having jurisdiction.

3.05 CLEARING

- A. That portion of the site required for constructing the work under these specifications shall be cleared of all vegetation, such as trees, brush, grass and weeds and all other objectionable matter to the limits as depicted in the plans.
 - 1. Stumps and roots shall be removed to a depth of 24 inches below finished subgrade elevation in area bounded by lines two feet behind back of curbs or to a depth of 24 inches below finished surface of required cross section for other areas.

- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.

3.06 STRIPPING

- A. Topsoil stripping:
 - 1. Remove sod and grass before stripping topsoil.
 - 2. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials. A minimum of 6 inches of soil shall be stripped. This must be verified with the geotechnical report provided by the owner for this project. If discrepancy, review with Owner prior to start of work.
 - a. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
 - 3. Strip man-made fills under structures and pavements to minimum 12" below the ground surface and dispose of all waste materials.
- B. At all times during clearing and stripping operations the area shall be kept in a manner to prevent ponding. Refer to Section 01 57 13 – Erosion and Sedimentation Control.

3.07 SITE IMPROVEMENTS

- A. Remove existing above and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
 - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion

3.08 STOCKPILING

- A. All topsoil from the stripping operations shall be stockpiled in the areas designated by the Owner's representative or shown on the drawings. Materials shall be deposited and spread in such a manner to ensure proper drainage and prevent severe erosion of the stockpile.
- B. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing.
- C. Stockpile materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to 72 inches.
 - 2. Do not stockpile material within tree protection zones.
 - 3. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

3.09 DISPOSAL

- A. Subject to approval of the Owner, material from clearing operations shall be disposed of by removal from the Project site.
 - 1. Disposal of Material by Removal
 - a. Material disposed of by removal from the construction area shall be removed from the areas prior to the completion of the work under these specifications. All materials removed shall become the property of the Contractor.
 - b. Materials to be disposed of by dumping shall be hauled to an approved dump. It shall be the responsibility of the Contractor to make any necessary arrangements with private parties and with local officials pertinent to locations and regulations of such dumping. Any fees or charges required to be paid for dumping of materials shall be paid by the Contractor.
 - c. In hauling any material from the site, it shall be the responsibility of the Contractor to prevent debris from dropping from vehicles and littering the site or area streets and roads. The Contractor shall promptly remove any debris which falls from vehicles.
 - d. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

END OF SECTION 31 11 00

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SECTION 31 22 13 – SITE GRADING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section pertains to the earthwork generally consisting of excavation, filling, backfilling and subgrade preparation as required for construction of site retaining walls/structures, slab on grade walks, pavement surfaces, landscaped areas and the general shaping of the site as shown, described or reasonably inferred on the drawings.
- B. This section excludes work necessary for building pad preparations.

1.02 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation, including excavation for trenches, or the top surface of a fill or backfill immediately below base course, pavement, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- E. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Owner's rep. Unauthorized excavation, as well as remedial work directed by the Owner's Rep shall be at the Contractor's expense.
- F. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- G. Unforeseen Excavation: Excavation of material, regardless of its character or nature, below the subgrade elevation required to construct the work as indicated on the drawings or specified herein.
- H. Geotechnical Engineer: Person or company contracted by the Owner and/or through the architect to provide testing and onsite Geotechnical services during the construction schedule.

1.03 REGULATORY REQUIREMENTS

- A. Contractor shall comply with all current, applicable codes and regulations.
- B. Contractor shall comply with all Standard Specifications and Details of Authorities having Jurisdiction for work in the right-of-way or easements.

- C. Shoring that is required to complete the Work, is considered a method or technique and is the sole responsibility of the Contractor. If a regulatory agency requires a licensed engineer to design, approve or provide drawings for shoring, then it is the sole responsibility of the Contractor to engage the services of a qualified Engineer for shoring design services at no additional cost to the Owner.
- D. Prior to commencement of work, the Contractor shall be responsible for obtaining, at the contractors own expense, all construction permits necessary to complete the project according to the plans and specifications.

1.04 PROJECT CONDITIONS

- A. Subsurface data is available from the Owner. Contractor is urged to carefully analyze the site conditions.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-preparation operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Prior to earthwork operations, existing utilities, facilities and permanent objects to remain shall be located and adequately protected.
- D. Protection of Existing Utilities:
 - 1. Existence and location of underground items are not guaranteed. Investigate and field verify before starting work. Excavation and backfill in the vicinity of existing items of work shall be carried out with extreme caution.
 - 2. Notify Texas 811 or the utility company involved to locate all public and private utility company lines before beginning work.
 - 3. Contractor shall be held responsible for any damage and for maintenance and protection of existing utilities.
 - 4. If unknown and uncharted utilities are encountered during excavation, promptly notify Owner's Representative and the governing utility company when determinable and wait for instructions.
 - 5. For private utilities found, if it is ascertained by Owner's Representative that such utility line has been abandoned, properly cap line at a depth approved by Owner's Representative or remove line as directed. All work to cap and remove abandoned public utilities found, must be coordinated through the governing utility company.
 - 6. If such unknown utilities are encountered and work is continued without contacting the Owner for instructions, and damage is caused to said utilities, Contractor shall repair, at his own expense, such damage to the satisfaction of the Owner and the Utility Company.
 - 7. Indicate on record drawings where there is conflict between field conditions and drawings.

1.05 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

- B. Samples: Submit samples of all materials used for Architect's approval wherever specified or as directed by the Architect.
- C. Shoring and Slope Protection Design:
 - 1. Prior to beginning any excavation, submit certification to the Architect that the proposed shoring and slope protection system has been accepted and approved by all governing jurisdictions. Certification shall be signed and sealed by the engineer of record for the shoring design.
 - 2. Provide signed letter from the Geotechnical Engineer stating that the proposed design complies with the recommendations of geotechnical reports.

1.06 QUALITY ASSURANCE

- A. Pre-Excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- B. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.
- C. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soil materials to verify that soils comply with specified requirements and to perform required field and laboratory testing. Contractor responsible to coordinate with the testing agency prior to start of work requiring testing so as to minimize unnecessary cost or delays to the project.
- D. Testing:
 - 1. Owner will retain and pay a qualified Geotechnical engineer to take all field samples and do all laboratory testing necessary to verify compliance of the work to these Specifications or as required by City or other regulatory agencies. The Geotechnical Engineer shall submit results of all testing done during the course of the work to the Owner, Architect, and Contractor.
 - 2. Notify testing lab a minimum of 48 hours in advance of the time testing is required to satisfy requirements of this section.
 - 3. Should testing specified above show work which does not satisfy these Specifications, the Contractor shall pay, through the Owner, for all additional tests required to determine the extent of work that is not satisfactory and for all additional tests necessary to demonstrate compliance with these specifications.
 - 4. All tests shall be performed by the Soil Engineer in accordance with ASTM D 1557, D1556, D2922, D3017, or other test method selected by Geotechnical Engineer.

PART 2 – PRODUCTS

2.01 SOIL MATERIALS

- A. Fill materials and sources must be approved by the Owner's Representative. The Contractor is responsible for providing adequate samples and testing results to the Owner for testing and approval.

- B. Select fill per 2.2 shall be used beneath all site retaining walls and site structures where fill material is required to achieve the grades and elevations on the plans.
- C. General fill per 2.3 shall be used for fill in landscaping areas not supporting structures. Topsoil per 2.4 shall be spread over landscape areas as needed.
- D. Fill material beneath paving shall be per 2.2 or 2.3. Regardless of the fill material used, subgrade shall be chemically stabilized for the thickness specified and detailed in the drawings.
- E. Material excavated onsite may be used as fills, with prior Geotechnical Engineer approval.
 - 1. Onsite fill materials shall be free of organic or deleterious products.
 - 2. Moisture content of existing soils may require adjustment for compaction approval.

2.02 SELECT FILL

- A. The select fill shall consist of sandy clay, lime stabilized clays or clean sand, uniformly graded and free of objectionable material.
 - 1. Sandy Clay Fill: Sandy clay fill shall have a plasticity index between 10 and 20. The fill materials shall be placed in loose lifts not exceeding 8 inches in height and compacted to 95 percent of Standard Maximum Density at the proper moisture content for that soil type as defined by ASTM D 698.
 - 2. Lime Stabilized Clay Fill: Clays may be stabilized in place or mixed with lime at another location on the site and placed and compacted. Lime stabilization shall be performed in accordance with Section 31 32 13.29 – Lime Stabilization or 31 32 13.26 – Lime-Fly Ash or Fly Ash Stabilization. The percent of lime to be used shall be determined by the testing laboratory at the source prior to acceptance of the material for fill. The material shall be placed in loose lifts not exceeding 8 inches in thickness and compacted to 95 percent of Standard Maximum Density at the proper moisture content for that soil type as determined by ASTM D 698.

2.03 GENERAL FILL

- A. General fill material shall be used for fill in landscaping areas not supporting structures, and may be used beneath pavement. General fill material may be any native soil free of debris, trash, rocks over one (1) inch in diameter and other objectionable material with a PI less than 35. General fill shall be placed and compacted in lifts not exceeding 8 inches in thickness to 95 percent standard density as defined by ASTM D 698. The fill shall be kept sufficiently low to accommodate the proper depth of topsoil and related sod or other vegetation.

2.04 TOPSOIL

- A. Topsoil material shall be native earthen material suitable for growth of vegetation such as silty and sandy loams. The site stripings may be used as topsoil unless otherwise shown on the drawings. Topsoil shall be free of roots and rocks larger than ½ inch (12 mm), subsoil, debris, large weeds and foreign matter. Topsoil shall be spread over landscape areas to a depth of 4 to 6 inches and compacted to 92 percent of standard density as defined by ASTM D 698.

2.05 SPECIAL DRAINAGE MEDIA

- A. All retaining wall and French drain backfill material shall be clean open-graded gravel, maximum 3/4" particle size in accordance with the details contained in the plans
- B. Drainage Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 90 lbf; ASTM D 4632.
 - 2. Tear Strength: 40 lbf; ASTM D 4533.
 - 3. Puncture Resistance: 50 lbf; ASTM D 4833.
 - 4. Water Flow Rate: 150 gpm per sq. ft.; ASTM D 4491.
 - 5. Apparent Opening Size: No. 50; ASTM D 4751.
- C. Approved Materials
 - 1. Mirafi 140 filter fabric.
 - 2. Contech C-35NW
 - 3. Approved alternate.

PART 3 – EXECUTION

3.01 PREPERATION

- A. Inspection
 - 1. Prior to performing the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where work may properly commence.
 - 2. Verify that survey bench mark and intended elevations for the Work are as indicated.
 - 3. Verify existing grades and dimensions before starting any grading operations.
 - 4. Verify that work may proceed in complete accordance with the design.
 - 5. In the event of discrepancy, immediately notify the Owner's Representative.
- B. General
 - 1. Use all means necessary to control dust on or near the site resulting from the performance of the Work. Thoroughly moisten all surfaces to prevent dust being a nuisance to the public, adjacent uses, and concurrent work on site. Moisture level during compaction operations shall not exceed that amount as specified by Geotechnical Engineer.
 - 2. Conduct work so as to avoid injury to persons and damage to adjacent property. Provide appropriate shoring, bracing and barriers, including light when necessary.
 - 3. Coordinate operations with, and provide access to, the Geotechnical Engineer or designated representative during demolition and construction for purposes of testing, investigation and inspection.
- C. Protect and maintain benchmarks and survey control points from disturbance during construction.

- D. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.
- E. Locate and clearly flag trees and vegetation to remain or to be relocated
- F. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- G. Protect subgrade from excessive drying or excessive moisture.

3.02 EXCAVATION

- A. General - Contractor shall complete all excavation required regardless of the variations in hardness, type, or density of materials encountered, to the dimensions and elevations shown on the drawings. When unsatisfactory material is uncovered, that material shall be removed and replaced with select fill or treated as directed by the Owner's Representative at no additional cost to the Owner.
- B. Excavation is unclassified and includes excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - 2. Remedial work due to over-excavation including provision of suitable and stable backfill meeting the degree of compaction required shall be at the Contractor's expense.
- C. If excavated materials of a suitable nature are not of sufficient quantity to complete the work, contractor may provide borrow material in sufficient quantity to complete the work with the approval of the Owner's Representative at no additional cost to the Owner.
- D. Dispose of excess satisfactory soil material and all unsatisfactory soil material and rock obtained from excavations in at no additional cost to the Owner in accordance with all local Ordinances and State and Federal Laws.
- E. Excavation for Pavement
 - 1. The material exposed after excavation shall be scarified to a depth of 6 inches and compacted to at least 95 percent of Standard (ASTM D 698) Maximum Density within plus or minus 3 percent of optimum moisture content of the soil. Where necessary to achieve the required compaction, stabilization methods as outlined in paragraph 2.2. A. 2 of this specification shall be used at no additional cost to the Owner.
 - 2. Excavation required beneath pavement sections shall comply with elevations and dimensions shown on the plans and detailed sections within a tolerance of plus or minus 0.10 foot. Contractor shall take care not to disturb areas that are designated to be protected or are outside the construction limits. Excavated areas shall be kept free of ground and surface water.
- F. Cut Slopes and Ditches: Slopes and grades of ditches shall conform to the plans within a tolerance of plus or minus 0.10 foot. No exposed slopes shall be steeper than three feet horizontal to one foot vertical. Where slope protection is specified or called out

on the plans, said protection shall be placed as soon as practical, after exposing the slope. Erosion and sedimentation controls shall be implemented in all cut areas as specified in Section 01 57 13 – Erosion and Sedimentation Control.

3.03 FILL AND BACKFILL

- A. Placement
 - 1. Fill material shall be placed in loose lifts not exceeding 8 inches for areas beneath site structures and pavement, and 12 inches for landscape areas not supporting structures. Fill areas shall be compacted to 95 percent of Standard Maximum Density at the proper moisture of that soil as defined by ASTM D 698.
 - 2. Each lift shall be thoroughly compacted and shall have obtained satisfactory density prior to proceeding with the next lift.
 - 3. The top 6 to 8 inches of material beneath vehicular pavement shall be stabilized after placement.
 - 4. Material shall be free of trash and rocks over 1 inch in diameter.
 - 5. Fill shall be brought up to the proper elevations as determined from the lines, grades, sections and elevations shown on the plans.

- B. Site Retaining Wall/Structure Backfill:
 - 1. Place granular material as engineered backfill at all building and site retaining walls.
 - 2. For precast site retaining walls, install specified gravel and filter fabric prior to backfill installation. Position according to manufacturer's recommendations.
 - 3. Place in accordance with applicable portions of the Specifications.
 - 4. Compact per approved methods, using hand operated compaction equipment. Compact to at least 90% per ASTM D1557.

- C. Compaction and Finishing
 - 1. Suitable compaction equipment commonly used to meet the requirements for this type of compaction work shall be used.
 - 2. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The surface grade shall be consistent with the drainage intent shown on the plans such that no unwanted ponding shall occur.
 - 3. Surface shall not be more than 0.10 feet above or below the established grade, and all ground surfaces shall vary uniformly between indicated grades.
 - 4. Cut material from the site may be used for fill material. Where cut material is used as fill, each lift of such material shall be properly mixed to obtain a uniform material with clay being the predominant material and maintaining a plasticity index less than 35.
 - a. Lime stabilization shall be used for clay material and shall conform to Section 31 32 13.19 – Lime Stabilization or 31 32 13.26 – Lime-Fly Ash or Fly Ash Stabilization.
 - b. Cement stabilization shall be used for sandy or silty materials and shall conform to Section 31 32 13.16 - Cement Stabilization.

3.04 EROSION CONTROL

- A. There shall be at all times adequate protection to newly graded areas to prevent soil erosion as provided in Section 01 57 13 – Erosion and Sedimentation Control.

- B. Soil erosion that occurs prior to acceptance of the work shall be repaired at no expense to the Owner.

- C. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- D. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Owner's Testing and Inspection Service; reshape and re-compact.
- E. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.05 GRADING

- A. Rough Grading
 - 1. Cut and fill shall be left sufficiently high to require cutting by fine grading.
 - 2. Grade to subgrade depths required for construction of finished surface materials and for controlled internal drainage of site.
- B. Fine Grading
 - 1. Fine grading shall conform to elevations required to ensure finished elevations as indicated on the drawings.
 - 2. At no additional cost to the Owner the Contractor shall be responsible for minor adjustments to finished grade if deemed required by the Owner's Representative.
 - 3. Provide a smooth transition between adjacent existing grades and new grades.
 - 4. Till, disc, hand rake or otherwise scarify soil removing all clods, stones, and undesirable material ½ inch or larger. Place and spread any additional material that may be required.
 - 5. Prepare to immediately begin planting operations of the completed and accepted finish grade to prevent excessive weed growth in lawn areas.
- C. Slope grades to direct water away from buildings and to prevent ponding at a minimum of 5% grade for the initial 10 feet, as shown on the drawings or as directed by the Owner's Representative. Maximum cross slope for all walkways shall be 2% for disabled access. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 0.1 foot (1.2 inches)
 - 2. Walks: Plus or minus ½ inch
 - 3. Pavements: Plus or minus ½ inch

3.06 TESTING AND INSPECTION

- A. Materials and installed work require testing to show that the specifications for the materials and work have been met. The Owner may, at the Owner's expense, take random tests on materials and installed work. The Contractor shall allow free access to material stockpiles and facilities at all times. In fill areas each lift must be tested and approved before proceeding on the next lift. Retesting of rejected materials and installed work, shall be done at the Contractor's expense.

- B. Contractor shall notify Owner's testing laboratory 24 hours in advance of beginning any earth work operations and coordinate testing schedules to meet these specifications.
- C. Maximum density tests per ASTM D 698 shall be taken on all fill materials at a rate of one test for each type of soil to be used and at least one test for every 1,000 cubic yards of fill.
- D. Field density tests per ASTM D 1556 or ASTM D 2922 shall be taken on all fill material at a rate of one test for every ten thousand 10,000 square feet and at least one test per lift.
- E. All imported fill material shall be approved prior to importing.

3.07 DUST ABATEMENT

- A. The Contractor shall comply with applicable Federal, State, and local laws and regulations concerning the prevention and control of dust pollution.
- B. During the performance of the work required by these specifications or any operations appurtenant thereto, whether on right-of-way provided by the Owner or elsewhere, the Contractor shall furnish all the labor, equipment, materials, and means required, and shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust which has originated from the contractor's operations from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from the contractor's operations under these specifications.
- C. Dust Control shall be accomplished by one of the following methods:
 - 1. Sprinkling the ground surface with water until it is moist.
 - 2. Whenever ordered by the Owner's Representative, the Contractor shall furnish and distribute over the traveled road surfaces, which have not yet been fully restored, an application of Calcium Chloride. The material used shall be Regular Flake Calcium Chloride having a minimum chemical content of Calcium Chloride of 77%. Unless otherwise specified or ordered by the Owner, rate of application shall be 3 pounds per square yard of surface covered.
 - 3. All methods of reducing formation of dust shall be at no additional cost to the Owner.

3.08 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- B. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- C. Stockpile Topsoil may not exceed 6 feet in height.

3.09 FIELD QUALITY CONTROL

- A. Testing shall be the responsibility of the Owner and costs of initial testing shall be paid by Owner. Cost of all subsequent testing necessary due to non-compliance with specifications shall be paid by Contractor.
- B. Density Test:
 - 1. Density tests shall be performed by an approved commercial testing laboratory approved per ASTM D 1557.
 - 2. Tests shall be performed in accordance with the referenced Standards.
 - 3. Field and laboratory tests for moisture density relations shall be determined in accordance with ASTM D 1557. The frequency and location of field density tests will be determined by the Geotechnical Engineer.
 - 4. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Owner.

3.10 DRAINAGE CONTROLS

- A. Provide all necessary temporary apparatus, pumps, curbs or ditches as required to divert or convey water from any source away from the Work. Do not allow water from any source to accumulate within or damage earthwork.

3.11 CLEANING AND DISPOSAL

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property at no additional cost to the Owner.
- C. Leave site clean and raked, ready to receive landscaping.

END OF SECTION 31 22 13

SECTION 31 23 13.11 – BUILDING SUBGRADE PREPARATION

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Excavating and backfilling trenches for utilities within building lines.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
 - 2. Division 02 Section "Selective Demolition" for removal of existing building slabs and below grade utilities within the existing building lines.

1.02 DEFINITIONS

- A. Backfill: Select fill soil material used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Borrow Soil: Select fill soil imported from off-site for use as fill or backfill.
- C. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- D. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- E. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.03 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For each borrow soil material proposed for use as select fill as follows:
 - 1. Classification according to ASTM D 2487.
 - 2. Laboratory compaction curve according to ASTM D 698.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials from off-site locations for selective fill soil.
- B. Select Fill: Inert cohesive/semi-cohesive sandy lean clays (CL)/clayey sands (SC) as classified according to USCS Soil Classification Groups according to ASTM D 2487, or a combination of these groups; free of rock or gravel, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 1. Liquid Limit (LL): 40 percent or less.
 - 2. Plasticity Index (PI): A range between 10 and 20.
 - 3. Maximum particle size of 4-inches or less and not to exceed one-half the loose lift thickness, which ever is smaller.

PART 3 - EXECUTION

3.01 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate proposed building slab area to subgrade elevations indicated regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for excavation or removal of obstructions.
 - 1. If excavated materials intended for site or paving fill and backfill include unsatisfactory soil materials and rock, remove from site for suitable disposal.
- B. Unknown Utilities and Obstacles: If unknown or uncharted utilities or objects which could be utilities are encountered during excavation, promptly notify the Architect before proceeding.

3.02 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: 12 inches each side of pipe or conduit unless otherwise indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped cement sand backfill.
 3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
- D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
- 3.03 UNAUTHORIZED EXCAVATION
- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.
- 3.04 STORAGE OF SOIL MATERIALS
- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- 3.05 UTILITY TRENCH BACKFILL
- A. Backfill utility trenches within the building area with select fill soil as described in Part 2 of this Section.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.
- C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- D. Backfill voids with select fill while removing shoring and bracing.
- E. Place and compact initial backfill of select fill to a height of 12 inches over the pipe or conduit.
1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of select fill soil to final subgrade elevation..
- 3.06 SOIL MOISTURE CONTROL
- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify to a depth of 8-inches and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 4 percent and is too wet to compact to specified dry unit weight.
- 3.07 COMPACTION OF SOIL BACKFILLS
- A. Place backfill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698:
1. Under structures and slabs scarify and recompact top 12 inches of existing subgrade and each layer of select fill soil material at 95 percent.
 2. For utility trenches, compact each layer of initial and final select fill soil material at 95 percent.
- D. Remove excavated soils and stock pile for reuse as general fill or hauled from site.
- 3.08 FIELD QUALITY CONTROL
- A. Inspections: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections as follows and as further described in Division 01 Section "Testing and Inspecting Services."
1. Determine that fill material and maximum lift thickness comply with specified requirements.
 2. Determine, at the required frequency, that in-place density of compacted select fill complies with requirements.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.
- 3.09 DISPOSAL OF SURPLUS AND WASTE MATERIALS
- A. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 23 13.11

SECTION 32 13 13 – CONCRETE SITE PAVING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies the requirements for forming and placing reinforced vehicular pavement, curbs, sidewalks, courtyards and pedestrian areas to the lines and grades shown on the drawings and constructed as specified herein.

1.02 REGULATORY REQUIREMENTS

- A. Contractor shall comply with all current, applicable codes and regulations.
- B. Contractor shall comply with all Standard Specifications and Details of Authorities having Jurisdiction (herein after referred to as "Standard Specifications") for work in the right-of-way or easements.
- C. Prior to commencement of work, the Contractor shall be responsible for obtaining, at the Contractor's own expense, all construction permits necessary to complete the project according to the plans and specifications.

1.03 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Material Test Reports: From a qualified testing laboratory indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
- D. Material Certificates: Signed by manufacturers certifying that each of the following materials which are part of this project, complies with requirements:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Applied finish materials.
 - 6. Bonding agent or epoxy adhesive.
 - 7. Joint fillers.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Owner will employ a qualified independent geotechnical engineering testing agency to take all field samples and do all laboratory testing necessary to verify compliance of the work to the Specifications or as required by City or other regulatory agencies.

Contractor shall be responsible to coordinate with the testing agency prior to start of work requiring testing so as to minimize unnecessary cost or delays to the project.

- C. Testing:
1. The Geotechnical Engineer shall submit results of all testing done during the course of the work to the Owner, Owner’s Representative, and Contractor.
 2. Notify testing lab a minimum of 48 hours in advance of the time testing is required to satisfy requirements of this section.
 3. Should testing specified above show work which does not satisfy these Specifications, the Contractor shall pay, through the Owner, for all additional tests required to determine the extent of work that is not satisfactory and for all additional tests necessary to demonstrate compliance with these specifications.

PART 2 – PRODUCTS

2.01 CONCRETE MATERIALS

- A. Portland Cement:
1. Sample and test cement to verify compliance with Standards of ASTM C 150, Type I or Type III.
 2. Bulk cement which meets referenced standards may be used when method of handling is approved by the Owner’s Representative. When using bulk cement, provide satisfactory weighing devices.
 3. Fly ash which meets standards of ASTM C 618 may be used as mineral fill when method of handling is approved by the Owner’s Representative.
- B. Water: Conform to requirements for water in ASTM C 94.
- C. Coarse Aggregate: Crushed stone, gravel, or combination thereof, which is clean, hard, and durable, conforms to requirements of ASTM C 33, and has abrasion loss not more than 45 percent by weight when subjected to Los Angeles Abrasion Test (ASTM C 131).
1. Maximum percentage by weight of deleterious substances shall not exceed following:

Item	Percent by Weight of Total Sample Maximum
Clay lumps and friable particles	3.0
Material finer than 75-µm (No. 200) sieve:	
Concrete subject to abrasion	3.0*
All Other concrete	5.0*
Coal and lignite:	
Where surface appearance of concrete is of importance	0.5
All other concrete	1.0

* In case of manufactured sand, when material finer than 75-µm (No. 200) sieve consists of dust of fracture, essentially free from clay or shale, these limits may be increased to 5 and 7 percent, respectively.

2. Conform coarse aggregate (size 1 1/2 inch to No. 4 sieve) to requirements of ASTM C 33. Use gradation within following limits when graded in accordance with ASTM C 136:

Sieve Designation (Square Openings)	Percentage by Weight
Retained on 1 3/4" sieve	0
Retained on 1 1/2" sieve	0 – 5
Retained on 3/4" sieve	30 – 65
Retained on 3/8" sieve	70 – 90
Retained on No. 4 sieve	95 – 100
Loss by Decantation Test (Tex-406-A)	1.0 Maximum

* In case of aggregates made primarily from crushing of stone, when material finer than 200 sieve is dust of fracture essentially free from clay or shale as established by Part III of TxDOT Tex-406-A, percent may be increased to 1.5.

- D. Fine Aggregate: Sand, manufactured sand, or combination thereof, composed of clean, hard, durable, uncoated grains, free from loams or other injurious foreign matter. Conform fine aggregate for concrete to requirements of ASTM C 33. Use gradation within following limits when graded in accordance with ASTM C 136:

Sieve Designation (Square Openings)	Percentage by Weight
Retained on 3/8" sieve	0
Retained on No. 4 sieve	0 – 5
Retained on No. 8 sieve	0 – 20
Retained on No. 16 sieve	15 – 50
Retained on No. 30 sieve	35 – 75
Retained on No. 50 sieve	65 -90
Retained on No. 100 sieve	90 – 100
Retained on No. 200 sieve	97 – 100

1. When subjected to color test for organic impurities (ASTM C 40), fine aggregate shall not show color darker than standard color. Fine aggregate shall be subjected to Sand Equivalent Test (Tex-203-F). Sand equivalent value shall not be less than 80, unless higher value is shown on Drawings.

- E. Mineral Filler: Type "C" or Type "F" fly ash of acceptable quality and meeting requirements of ASTM C 618 may be used as mineral admixture in concrete mixture. When fly ash mineral filler is used, store and inspect in accordance with ASTM C 618. Do not use fly ash in amounts to exceed 20 percent by weight of cementitious material in mix design. Cement content may be reduced when strength requirements can be met. Note: When fly ash is used, term "cement" is defined as cement plus fly ash.

- F. Air Entraining Agent: Furnish air entraining agent conforming to requirements of ASTM C 260.

- G. Water Reducer: Water reducing admixture conforming to requirements of ASTM C 494 may be used when required to improve workability of concrete. Amount and type of admixture is subject to approval by the Owner's Representative.

2.02 MIXING

- A. Flexural strength shall be as specified using test specimens prepared in accordance with ASTM C 31 and tested in accordance with ASTM C78 (using simple beam with

third-point loading). Compressive strength shall be as specified using test specimens prepared in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Determine and measure batch quantity of each ingredient, including water for batch designs and all concrete produced for Work. Mix shall conform to these specifications and other requirements indicated on Drawings.

B. Vehicular Pavement and Curbs

1. Mix design shall have a minimum compressive strength of 3,000 pounds per square inch at 7 days and 3,500 pounds per square inch at 28 days when tested in accordance with ASTM C39. Slump of concrete shall be at least 3 inches but no more than 6 inches, when tested in accordance with ASTM C143.
 - a. Determine cement content in accordance with ASTM C 138 (water-cement ratio maximum 0.57). Addition of mineral filler may be used to improve workability or plasticity of concrete to limits specified.
 - b. Coarse dry aggregate shall not exceed 85 percent of loose volume of concrete.
 - c. Add air-entraining admixture to ensure uniform distribution of agent throughout batch. Base air content of freshly mixed air-entrained concrete upon trial mixes with materials to be used in Work, adjusted to produce concrete of required plasticity and workability. Percentage of air entrainment in mix shall be 4 1/2 percent plus or minus 1 1/2 percent. Determine air content by testing in accordance with ASTM C 231.
 - d. Use retardant when temperature exceeds 90 degrees F. Proportion as recommended by manufacturer. Use same brand as used for air-entraining agent. Add and batch material using same methods as used for air-entraining agent.

C. Sidewalk, Courtyard and Pedestrian Area Pavement

1. Mix design shall have a minimum compressive strength of 3,000 pounds per square inch at 28 days when tested in accordance with ASTM C39. Slump of concrete shall be at least 3 inches but no more than 6 inches, when tested in accordance with ASTM C143.
 - a. Determine cement content in accordance with ASTM C 138 (water-cement ratio maximum 0.57). Addition of mineral filler may be used to improve workability or plasticity of concrete to limits specified.
 - b. Coarse dry aggregate shall not exceed 85 percent of loose volume of concrete.
 - c. Add air-entraining admixture to ensure uniform distribution of agent throughout batch. Base air content of freshly mixed air-entrained concrete upon trial mixes with materials to be used in Work, adjusted to produce concrete of required plasticity and workability. Percentage of air entrainment in mix shall be 4 1/2 percent plus or minus 1 1/2 percent. Determine air content by testing in accordance with ASTM C 231.
 - d. Use retardant when temperature exceeds 90 degrees F. Proportion as recommended by manufacturer. Use same brand as used for air-entraining agent. Add and batch material using same methods as used for air-entraining agent.

D. High Early Strength Concrete

1. Use high early strength concrete pavement to limits shown on Drawings or as required to meet the project schedule. Design to meet the following:
 - a. Concrete Mix: Flexural strength greater than or equal to 500 psi at 72 hours.

- b. Cement: Minimum of 7 sacks of cement per cubic yard of concrete.
 - c. Water-Cement Ratio maximum of 0.45. Slump of concrete shall a maximum of 5 inches, when tested in accordance with ASTM C 143.
- E. No additional water shall be added to the concrete at the job site.

2.03 REINFORCING STEEL

- A. Provide new deformed billet steel conforming to ASTM A 615, Grade 60. Store steel to protect it from mechanical injury and rust. At time of placement, steel shall be free from dirt, scale, rust, paint, oil, or other injurious materials.
- B. Cold bend reinforcing steel to shapes shown. Once steel has been bent, it may not be rebent.
- C. Welded wire fabric may only be utilized if indicated on the drawings. If wire fabric is utilized provide wire fabric conforming to ASTM A 82. Use fabric in which longitudinal and transverse wires have been electrically welded at points of intersection. Welds shall have sufficient strength not to be broken during handling or placing. Conform welding and fabrication of fabric sheets to ASTM A 185.
- D. Employ supports of approved shape and size that will secure reinforcing steel and joint assembly in correct position during placing and finishing of concrete. Space supports as directed by the Owner's Representative. Charis shall be W.H.C. Products, Inc. - Series "G"; or Aztec "Castle" with sand plates.

2.04 ISOLATION JOINT MATERIAL

- A. Filler board of selected stock. Clear, all-heart redwood weighing no more than 30 pounds per cubic foot, after being oven dried to constant weight.
- B. Board filler shall be free of defects which will impair their usefulness as expansion joint fillers.

2.05 LOAD TRANSMISSION DEVICES

- A. Load Transmission devices shall be as detailed on plans and conform to the properties specified in ASTM A615, Grade 60 steel.

2.06 STEEL DOWEL BARS

- A. Steel dowel bars and steel reinforcement shall be deformed or smooth bars conform in properties to ASTM A 615 Grade 40. Unless otherwise shown on the plans all reinforcing steel shall be deformed bars, all dowel bars at joints shall be smooth bars, and all curb dowels shall be deformed bars.
- B. Greenstreak two component speed dowel system can be used at construction joints pending engineer approval. Product submittal required for approval.
- C. Greenstreak two component speed load system can be used at isolation joints pending engineer approval. Product submittal required for approval.

2.07 NONSHRINK GROUT

- A. Nonmetallic, nonshrink grout containing no chloride producing agents conforming to following requirements.
 - 1. Compressive strength
 - a. at 7 days: 3,500 psi
 - b. at 28 days: 8,000 psi
 - 2. Initial set time: 45 minutes
 - 3. Final set time: 1.5 hours

2.08 LIQUID MEMBRANE-FORMING COMPOUNDS

- A. Liquid membrane-forming compounds shall conform to ASTM C 309, Type 1 or Type 2, white pigmented. Membrane shall restrict loss of water to not more than 0.55 kg/m² in 72 hours using test method ASTM C 156.

2.09 COVER MATERIALS FOR CURING

- A. Polyethylene Film: Opaque pigmented white film conforming to requirements of ASTM C 171.

2.10 JOINT SEALING COMPOUND

- A. Self-Leveling, Low Modulus Silicone or Polyurethane Sealant for Asphaltic Concrete and Portland Cement Concrete joints conforming to the requirements of TXDoT DMS-6310 for Class 5 Joint Sealants.

PART 3 – EXECUTION

3.01 PREPERATION

- A. Verify subgrade lines and grades.
- B. The subgrade shall be a previously prepared subgrade, stabilized if required, compacted to a minimum of 95% standard density ASTM D-698, and graded to the required section and grades shown on the drawings and as specified.
- C. Proof-roll prepared sub-base surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
- D. Rolling and sprinkling shall be performed to maintain the specified moisture content of the subgrade as necessary prior to placing the concrete.

3.02 FORMS

- A. Forms shall be of wood or metal, properly treated to ensure concrete does not adhere to the forms, straight, clean, free from warp or defect, and of sufficient depth.
- B. The forms shall be so placed that when placed each form section will be firmly in contact for its whole length and base width and exactly at the established grade.

- C. Any subgrade under the forms below established grade shall be corrected using suitable material, placed, sprinkled, and rolled.
- D. Forms shall be securely staked and tightly jointed and keyed to prevent displacement.
- E. Sufficient stability of forms to support equipment operated thereon and to withstand its vibration without springing shall be required.
- F. Forms shall remain in place not less than 24 hours after concrete is placed.

3.03 JOINTS

- A. Shall be constructed in the pavement slab at locations and according to details as shown on the drawings. Stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position.
- B. When new Work is adjacent to existing concrete, place joints at same location as existing joints in adjacent pavement.
- C. Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
- D. Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
- E. Form isolation joints of board filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
- F. Expansion Joints shall be constructed with board filler and sealed at top. Board filler must be perpendicular to plane of concrete slab. Alignment of joint shall not vary more than 1/4 inch in 10 feet.
- G. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness. If applicable, match jointing of existing adjacent concrete pavement.
- H. Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/16-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces..

3.04 REINFORCING STEEL

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Reinforcing Steel shall be accurately placed as shown on drawings and secured in place. Wire reinforcing bars securely together at intersections and splices. All bars shall be supported on and secured to steel or plastic bar chairs. Laps shall be a minimum of ten (10) inches and tied. Bars and coatings shall be free of rust, dirt or other foreign matter when concrete is placed.

- C. Use sufficient number of chairs for steel reinforcement bars to maintain position of bars within allowable tolerances. Place reinforcement as shown on Drawings. In plane of steel parallel to nearest surface of concrete, bars shall not vary from plan placement by more than 1/12 of spacing between bars. In plane of steel perpendicular to nearest surface of concrete, bars shall not vary from plan placement by more than 1/4 inch.
- D. Drill dowels into existing pavement, secure with epoxy, and provide paving headers as required to provide rigid pavement sections.

3.05 CONCRETE PLACEMENT

- A. Concrete not placed as herein prescribed within 90 minutes after mixing shall be rejected.
- B. Concrete shall not be placed when temperature is below 40 degrees F and falling, but may be placed when the temperature is above 35 degrees F and rising, the temperature being taken in the shade and away from artificial heat.
- C. Concrete shall not be placed before the time of sunrise, and shall not be placed later than will permit the finishing of the pavement during sufficient natural light.
- D. Moisten sub-base to provide a uniform dampened condition at time concrete is placed.
- E. Deposit concrete continuously in successive batches. Distribute concrete in manner that will require as little rehandling as possible. Where hand spreading is necessary, distribute concrete with shovels or by other approved methods. Use only concrete rakes in handling concrete. At placement interruption of more than 30 minutes, place transverse construction joint at stopping point. Remove and replace sections less than 10 feet long.
- F. Take special care in placing and spading concrete against forms and at longitudinal and transverse joints to prevent honeycombing. Voids in edge of finished pavement will be cause for rejection.
- G. Concrete shall be consolidated by a mechanical vibrator to remove all voids. Special care shall be exercised in placing and spading concrete against forms and at all joints to prevent the forming of honeycombs and voids and to prevent displacement of steel reinforcement and load transmission devices.
- H. The concrete shall be struck off with an approved strike-off screed to such elevation that when consolidated and finished, the surface of pavement shall conform to the required section and grade. In no case shall the maximum ordinate from a 10 foot straight edge to the pavement be greater than 1/8 inch.
- I. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction the work is progressing, maintaining the template in contact with the forms, and maintaining a slight excess of material in front of the cutting edge.

3.06 FINISHING

- A. Do not add water to concrete surfaces during finishing operations.
- B. After completion of a strike-off, consolidation and transverse screeding, a hand-operated longitudinal float shall be operated to test and level the surface to the required grade. The longitudinal float shall be held in contact with the surface and parallel to the center line, and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete shall be placed if required, and screeded, and the float shall be used to produce a satisfactory surface.
- C. Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform texture.
 - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - 2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
 - 3. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.07 TOLERANCES

- A. Test entire surface before initial set and correct irregularities or undulations. Bring surface within requirements of following test and then finish.
- B. Comply with tolerances of ACI 117 and as follows:
 - 1. Elevation: 1/4 inch.
 - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 - 3. Surface: Gap below 10-foot long, unlevelled straightedge not to exceed 1/16 inch.
 - 4. Joint Spacing: 3 inches.
 - 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 - 6. Joint Width: Plus 1/8 inch, no minus.

3.08 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures for a period of not less than 72 hours from the beginning of the curing operation.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Apply liquid membrane-forming compound in accordance with manufacturer's instructions.

- E. Moisten concrete by water fogging prior to application of membrane when surface has become dry.
- F. Seal concrete surface with single coat at rate of coverage recommended by manufacturer and directed by the Owner's Representative, but not less than one gallon per 200 square feet of surface area.

3.09 CURBS

- A. Dowelled on Curb
 1. After curing the concrete pavement, doweled on curbs, using secure forms shall be constructed to the size shown on the plans.
 2. Dowels may be placed in the pavement slab before the concrete has set, or placed in drilled holes using epoxy adhesive to secure the bars in place.
 3. Pavement joints shall extend through the curbs. Expansion joint material shall be the same thickness, type and quality as specified for the pavement.
 4. When sawed joints are provided, the placement of curb shall be delayed until all transverse joints are sawed.
 5. All joints should be tool finished after sufficient curing of the concrete.
 6. The concrete, reinforcement and curing of the curbs shall conform to the requirements specified for the concrete pavement.
 7. In finishing the curbs, a thin coating of mortar shall be worked into the exposed face of the curb in order to obtain a brush finish free of all blemishes and form or tool marks.
 8. Curbs shall have a straightness tolerance of 1/8 inch in 10 feet, measured longitudinally along the back and face of the curb.
 9. The top of the curb shall not vary vertically in height more than 1/8" when measured up from the concrete pavement.
- B. Monolithic Curbs and Curb and Gutter
 1. Monolithic curb and curb and gutter shall conform to the specifications for doweled on curb and the details shown on the plans.
 2. Monolithic curb and curb and gutter shall be constructed after final grading of the subgrade and before placement of the base material.
 3. These curbs shall be cured for at least 72 hours and shall be properly backfilled behind the curb by hand tamping to 95% standard proctor density ASTM D 698 before placing the base material.

3.10 APPLICATION OF JOINT SEALING COMPOUND

- A. Joints shall be thoroughly cleaned of loose scale, dirt, dust, and curing compound. When necessary, existing joint material shall be removed to the depth as shown on the plans.
- B. Joints shall be filled to the full depth of the joint opening. Pouring shall be done in a neat and workman like manner to give satisfactory results. Sufficient joint sealer shall be poured into the joints so that upon the completion of the work the surface of sealer within the joint shall be 1/4" above top of the pavement surface.

3.11 FIELD QUALITY CONTROL

- A. Compressive Strength Test Specimens: Make four test specimens for compressive strength test in accordance with ASTM C 31 for each 150 cubic yards or less of pavement that is placed in one day. Test two specimens at 7 days or at number of hours as directed by the Owner's Representative for high early strength concrete. Test remaining two specimens at 28 days. Test specimens in accordance with ASTM C 39. Laboratory technician will prepare concrete test cylinders.
- B. When compressive test indicates failure, make yield test in accordance with ASTM C 138 for cement content per cubic yard of concrete. When cement content is found to be less than that specified per cubic yard, increase batch weights until amount of cement per cubic yard of concrete conforms to requirements.
- C. Minimum of one 4 inch core will be taken at random locations per 5,000-square feet of pavement to measure in-place depth. Measure depth in accordance with ASTM C 174. Each core may be tested for 28 day compressive strength according to methods of ASTM C 42. 28 day compressive strength of each core tested shall be a minimum of 3,000 pounds per square inch.
- D. Request, at option, three additional cores in vicinity of cores indicating nonconforming in-place depths at no cost to the Owner. In-place depth at these locations shall be average depth of four cores.
- E. Fill cores and density test sections with new concrete paving or non-shrink grout.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Protect concrete from damage.
- C. The pavement shall be closed to all traffic, including vehicles of the Contractor, until the concrete is at least 7 days old or has attained a minimum average of 3,000 psi compressive strength.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.
- E. Any damage to the pavement prior to acceptance by the Owner shall be repaired by the Contractor at no extra cost to the Owner.

END OF SECTION 32 13 13

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SECTION 32 17 13 – PARKING BUMPERS

PART 1 – GENERAL

1.02 SECTION INCLUDES

- A. Precast concrete parking bumpers and anchorage

1.03 SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.01 CONCRETE BUMPERS

- A. Concrete Materials: ASTM C33; water and sand
- B. Reinforcing Steel: ASTM A615, deformed steel bars; unfinished galva-nized epoxy finish, strength and size commensurate with precast unit design
- C. Concrete Mix: Minimum 3000 psi, 28 day strength, air entrained to 5 to 7 percent
- D. Use rigid molds, constructed to maintain precast units uniform in shape, size, and finish. Maintain consistent quality during manufacture.
- E. Cure units to develop concrete quality and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- F. Minor patching in plant is acceptable, providing appearance of units is not impaired.

2.02 CONFIGURATION

- A. Nominal Size: 6 inches high, 6 inches wide, 8 feet long
- B. Profile: Manufacturer's standard

2.03 ACCESSORIES

- A. Dowels: Cut reinforcing steel, 1/2 inch diameter, 12 inches long

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General: Install wheel stops according to manufacturer's written instructions unless otherwise indicated.
- B. Install units without damage to shape or finish. Replace or repair damaged units.
- C. Install units in alignment with adjacent work.
- D. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 32 17 13

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes painted markings applied to concrete pavement.
- B. Related Requirements:
 - 1. Section 09 91 00 "Painting" for painting interior and exterior concrete surfaces other than pavement.

1.02 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
 - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.03 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Glidden
 - 3. PPG Industries.
 - 4. Pratt & Lambert.
 - 5. Sherwin-Williams Company (The).

2.02 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type I, with drying time of less than 45 minutes.
 - 1. Color: White, Yellow, Blue, as indicated on Drawings.
 - 2. Color: Red as indicated on Drawings for "fire lane" designation.
- B. VOC Content: Pavement markings shall have a VOC content of 150 g/L or less.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.02 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.

3.03 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23