PROJECT MANUAL

BP010 TURF and ATHLETICS
CSP 26-021 KB

FORT BEND INDEPENDENT SCHOOL DISTRICT

100% CONSTRUCTION DOCUMENTS
October 9, 2025

Project No. 25-005

pfluger

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List of Specifications, As Prepared by:

pfluger



10/9/2025

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10 05 00 - MISCELLANEOUS SPECIALTIES
10 44 13 - FIRE EXTINGUISHERS AND CABINETS

DIVISION 11 00 00 - EQUIPMENT
11 68 50 - ATHLLETIC EQUIPMENT (BASEBALL & SOFTBALL)

DIVISION 32 00 00 – EXTERIOR IMPROVEMENTS
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SECTION 00 01 10.2 TABLE OF CONTENTS: CIVIL

List of Specifications, As Prepared by:

TEXAS SPORTS & CIVIL ENGINEERING
11767 KATY FREEWAY, SUITE 1112
HOUSTON, TX 77079



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32 92 23 FERTILIZER
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END OF SECTION 00 01 10.2

SECTION 00 01 10.4 TABLE OF CONTENTS: STRUCTURAL

List of Specifications, As Prepared by:

BMG STRUCTURAL ENGINEERS
11111 KATY FREEWAY, SUITE 910
HOUSTON, TX 77079

DIVISION 00 – DIVISION NAME

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SECTION 00 01 10.6 **TABLE OF CONTENTS: MEP ENGINEER**

List of Specifications, As Prepared by:

ENGINEERS

GK PROJECT #: 2025.044

MEP CONSULTANT:
GK Engineers, LLC
TBPE # F-18854
5959 West Loop South, Suite 350
Bellaire, TX 77401
Phone: 713.988.8894
GKEngineers@gk-mep.com
HUB / MWBE CERTIFIED

DIVISION 26 – ELECTRICAL

260519 FL – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260533 FL – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
260544 FL – SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING
260553 FL – IDENTIFICATION FOR ELECTRICAL SYSTEMS
262416 FL – PANELBOARDS
262726 FL – WIRING DEVICES
265619 FL – LED EXTERIOR LIGHTING

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220529 FL – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
220719 FL – PLUMBING PIPING INSULATION
221116 FL – DOMESTIC WATER PIPING

END OF SECTION 00 01 10.6

Davia Ann Gernand 10/09/2025

STATE OF TEXAS
DAVIA ANN GERNAND
109903
LICENSED
PROFESSIONAL ENGINEER

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INSPIRE • EQUIP • IMAGINE

Fort Bend Independent School District

Competitive Sealed Proposal for

BP010 Turf & Athletics
CSP 26-021KB

Package "A" Base Bid and all documents except Alternates & SBE documents.
DUE NO LATER THAN 2:00 PM Central Time (CST) November 13, 2025

Package "B" Alternates and Package "C" SBE
DUE NO LATER THAN
3:00 PM Central Time (CST) November 13, 2025

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

SUBMIT PROPOSAL PACKET THROUGH:

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

Signed by: Bernice Edwards C353F1AF98FD486... 10/3/2025

Signed by: Ryan Kiefer 1F973D1CC91A41D... 10/3/2025

Signed by: Brenda Garcia F7F6BD96D7C742E... 10/3/2025

Signed by: DF25ADA7E416421... 10/3/2025

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BP010 Turf & Athletics
CSP 26-021KB

BACKGROUND:

Fort Bend ISD (FBISD) is a K-12 public school district in Fort Bend County serving a student enrollment of over 78,000. The district currently consists of 84 campuses and multiple administrative sites. The intention of this Competitive Sealed Proposal (CSP) is to solicit proposals for the installation of artificial turf at baseball and softball fields and associated renovations at five (5) high school campuses Austin High School, Dulles High School, Elkins High School, Kempner High School and Willowridge High School (BP010). The estimated construction cost of work for this project is **Twenty million dollars ($20,000,000).**

PRE-PROPOSAL CONFERENCE:

A pre-proposal conference will be held on **Thursday, October 23, 2025 at 10:00 AM (CST)** virtually using Microsoft Teams. Attendance is highly recommended in order to have an understanding of the requirements of this CSP. For this pre-proposal meeting, persons with disabilities requiring special accommodations should contact: Kathleen Booker at kathleen.booker@fortbendisd.gov at least two (2) days before the conference. Any questions/clarifications that result from the visit should be submitted through the **Ask a Question** section in Bonfire.

Meeting Link: **Join the meeting now**

WALK SCHEDULE:

A pre-proposal walk is scheduled for **Monday, October 27, 2025, 9:00 AM (CST)** at Stephen F Austin High School, I. H. Kempner High School, Dulles High School, Elkins High School, Willowridge High School 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 **Ask a Question** section in Bonfire before the deadline for questions due date and time **Thursday, October 30, 2025 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.

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

GENERAL TERMS, CONDITIONS, AND REQUIREMENTS FOR SOLICITATIONS:

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

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

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

VENDOR COMMUNICATION:

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

Therefore:

- Other than the designated contact person listed in this CSP: All Communication regarding this CSP with District employees, staff, consultants, Architects/Engineers or Board members is strictly forbidden and may result in disqualification.

- All requests for clarification must be provided in writing through the e-bidding portal **Ask a Question** section to the designated contact person.

- The answer to the request for clarification and all other communication, clarification, or questions regarding this CSP will be issued in writing to all participating firms through the e-bidding portal (Bonfire).

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Scope of Work

FBISD is seeking a contractor for installation of artificial turf at baseball and softball fields and associated renovations at five (5) high school campuses - Austin High School, Dulles High School, Elkins High School, Kempner High School and Willowridge High School (BP010).

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 installation of artificial turf at baseball and softball fields and associated renovations approximately **Fifteen million dollars ($15,000,000**).

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

Senior Buyer: Kathleen Booker
Email: kathleen.booker@fortbendisd.gov

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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 points**

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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 (1st run)	10/14/2025
2.	Job advertises (2nd run)	10/21/2025
3.	Pre-Proposal Conference 10:00 AM (CST)	10/23/2025
4.	Final Questions due 10:00 AM (CST)	10/30/2025
5a.	Proposal Package "A" Due **2:00 PM (CST)** Base Bid and all documents, except Alternates and SBE documents Click or tap here to enter text.	11/13/2025
5b.	Proposal Package "B" Due **3:00 PM (CST) Alternates only**	11/13/2025
5c.	Proposal Package "C" Due **3:00 PM (CST) SBE documents only**	11/13/2025
6.	Presentation to Board of Trustees for contract award (Tentative, subject to change)	02/2026
7.	Tabulations and awards posted to https://fortbendisd.bonfirehub.com/portal/?tab=pastOpportunities	02/2026
8.	Substantial Completion of the Work	12/28/2026

SUBMISSION DEADLINE:

Fort Bend ISD will accept proposals submitted electronically through Bonfire e-bidding portal until **Thursday, November 13, 2025** at **2:00 PM CST**. https://fortbendisd.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, November 13, 2025 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 anyof 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.

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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.

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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.

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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.

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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.

Certificate Of Completion

Envelope Id: 83591BB4-CAEC-4DA5-93F1-8DFFFC092A8E
Status: Completed
Subject: Please DocuSign: BP010 Turf & Athletics (CSP 26-021KB)-Advertisement Request
Source Envelope:
Document Pages: 10
Signatures: 4
Certificate Pages: 3
Initials: 0
AutoNav: Enabled
EnvelopeId Stamping: Enabled
Time Zone: (UTC-08:00) Pacific Time (US & Canada)

Envelope Originator:
Christine Manrique
16431 Lexington Blvd
Sugar Land, TX 77479
christine.manrique@fortbendisd.gov
IP Address: 161.51.248.19

Record Tracking

Status: Original
10/3/2025 8:21:24 AM
Holder: Christine Manrique
christine.manrique@fortbendisd.gov
Location: DocuSign

Signer Events	Signature	Timestamp
Benice Edwards benice.edwards@fortbendisd.gov Security Level: Email, Account Authentication (None)	Signed by: Benice Edwards C353F1AF96FD466... Signature Adoption: Pre-selected Style Using IP Address: 161.51.248.19	Sent: 10/3/2025 8:28:40 AM Viewed: 10/3/2025 8:29:22 AM Signed: 10/3/2025 8:41:26 AM
Electronic Record and Signature Disclosure: Not Offered via Docusign		
Ryan Kiefer ryan.kiefer@fortbendisd.gov Security Level: Email, Account Authentication (None)	Signed by: Ryan Kiefer 1F973D1CC91A41D... Signature Adoption: Pre-selected Style Using IP Address: 161.51.248.19	Sent: 10/3/2025 9:14:40 AM Viewed: 10/3/2025 9:20:18 AM Signed: 10/3/2025 9:20:53 AM
Electronic Record and Signature Disclosure: Not Offered via Docusign		
Brenda Garcia brenda.garcia@fortbendisd.gov Security Level: Email, Account Authentication (None)	Signed by: Brenda Garcia F7F6BD96D7C742E... Signature Adoption: Pre-selected Style Using IP Address: 2607:fb90:5d61:4676:28b9:56ec:f52e:5bd6 Signed using mobile	Sent: 10/3/2025 8:41:29 AM Resent: 10/3/2025 9:20:55 AM Viewed: 10/3/2025 11:13:17 AM Signed: 10/3/2025 11:13:49 AM
Electronic Record and Signature Disclosure: Not Offered via Docusign		
Doris Emeka Onyenwe doris.emekaonyenwe@fortbendisd.gov Security Level: Email, Account Authentication (None)	Signed by: DF25ADA7E416421... Signature Adoption: Drawn on Device Using IP Address: 161.51.248.96	Sent: 10/3/2025 11:13:52 AM Viewed: 10/3/2025 11:15:04 AM Signed: 10/3/2025 11:15:43 AM
Electronic Record and Signature Disclosure: Not Offered via Docusign		

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

Agent Delivery Events	Status	Timestamp

Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp
Prachi Khanna cn_prachi.khanna@fortbendisd.gov Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via Docusign	COPIED	Sent: 10/3/2025 11:15:44 AM
Jane Thompson cn_jane.thompson@fortbendisd.gov Executive Assistant to Daniel Bankhead Fort Bend ISD Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via Docusign	COPIED	Sent: 10/3/2025 11:15:45 AM
Daniel Bankhead daniel.bankhead@fortbendisd.gov Exec. Dir. Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via Docusign	COPIED	Sent: 10/3/2025 11:15:45 AM
Kathleen Booker Kathleen.Booker@fortbendisd.gov Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via Docusign	COPIED	Sent: 10/3/2025 11:15:45 AM Viewed: 10/3/2025 11:17:48 AM
Antoinette Lewis Antoinette.Lewis1@fortbendisd.gov Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via Docusign	COPIED	Sent: 10/3/2025 11:15:45 AM

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
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Envelope Updated	Security Checked	10/3/2025 9:13:59 AM
Envelope Updated	Security Checked	10/3/2025 9:13:59 AM
Envelope Updated	Security Checked	10/3/2025 9:13:59 AM
Envelope Updated	Security Checked	10/3/2025 9:14:39 AM
Envelope Updated	Security Checked	10/3/2025 9:14:39 AM
Certified Delivered	Security Checked	10/3/2025 11:15:04 AM
Signing Complete	Security Checked	10/3/2025 11:15:43 AM

Envelope Summary Events	Status	Timestamps
Completed	Security Checked	10/3/2025 11:15:45 AM

Payment Events	Status	Timestamps

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://fortbendisd.bonfirehub.com/portal/ is the source for all CSP documents and direction; Addenda, Proposal packet, Drawings and specifications.

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

CSP Process for Successful Bidders

1.0 GENERAL INFORMATION

1.1 The Proposer will furnish and pay for a bid bond in the form of a bid bond, postal money order, certified check or cashier's check in the amount of five percent (5%) of the total greatest amount, bid including any applicable alternates, in accordance with Section 6.0.

1.2 If awarded, the Bidder shall furnish and pay for a Performance Bond and a Payment Bond each in the full contract amount in accordance with Section 7.0. Include this cost in your bid.

1.3 Bidder shall carry and keep in full force for the duration of the Project, insurance coverage for builder's risk, workmen's compensation, comprehensive general liability, and automobile liability as required by the General Provisions and/or Supplementary General Conditions of the Specifications, as outlined in Section 8.0.

1.4 The Bidder will assign a competent full-time superintendent, to the project, and that superintendent shall be maintained on the project for the duration of the project, subject only to his continuous employment.

1.5 During this process all communication regarding this CSP with district employees, staff, consultants (Architects/Engineers), or Board members is strictly forbidden and may result in disqualification. (Other than the designated contact person listed in this CSP)

1.6 In accordance with Texas Government Code Section 2269, The Board of Trustees, as appropriate, has delegated its authority under this subchapter regarding an action authorized or required by this subchapter to be taken by a school district to the Ft Bend ISD Superintendent. In procuring the construction services, the Board of Trustees has delegated the ranking, selection, or evaluation of bids.

1.7 In determining the award of contract and in accordance with Texas Government Code Section 2269, the district may consider: the price, the offeror's experience and reputation, the quality of the offeror's goods or services, the impact on the ability of the governmental entity to comply with rules relating to historically underutilized businesses, the offeror's safety record, the offeror's proposed personnel, whether the offeror's financial capability is appropriate to the size and scope of the project; and any other relevant factor specifically listed in the request for bids, proposals, or qualifications.

1.8 Evaluation of the proposed substitutes/deviations does not constitute Owner's acceptance of the substitutes/deviations but can be considered during negotiations.

1.9 In accordance with Texas Government Code Section 2269, The district shall select the offeror that submits the proposal that offers the best value for the governmental entity based on:

- the selection criteria in the request for proposal and the weighted value for those criteria in the request for proposal; and
- its ranking evaluation.

1.10 In accordance with Texas Government Code Section 2269 the Board of Trustees has determined the method that provided the best value for the district is the Competitive Sealed Proposal method.

1.11 In accordance with Texas Government Code Section 2269 the district shall publish in the request for proposals or qualifications the criteria that will be used to evaluate the offerors, and the applicable weighted value for each criterion.

1.12 In accordance with Texas Government Code Section 2269 the district shall document the basis of its selection and shall make the evaluations public not later than the seventh day after the date the contract is awarded.

1.13 In accordance with Texas Government Code Section 2269, the district will receive, publicly open, and read aloud the names of the offerors and their bids.

1.14 In accordance with Texas Government Code Section 2269, the district will evaluate and rank each proposal submitted no later than 45 days after the opening.

1.15 In accordance with Texas Government Code Section 2269, The district shall first attempt to negotiate a contract with the selected offeror. The district and its architect or engineer may discuss with the selected offeror options for a scope or time modification and any price change associated with the modification. If the district is unable to negotiate a satisfactory contract with the selected offeror, the district shall, formally and in writing, end negotiations with that offeror and proceed to the next offeror in the order of the selection ranking until a contract is reached or all proposals are rejected.

2.0 COMPETITIVE SEALED BID DOCUMENTS PRE-BID

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

3.0 COMPETITIVE SEALED PROPOSAL PACKET

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

3.2 Bonfire Submittal Organization

SUBMIT PROPOSAL PACKET THROUGH:
https://fortbendisd.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.

Insurance Required	Limit Required
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 Workers 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.

10.19.16BC Morrison

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

Insurance Conditions

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

All certificates must include:

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

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

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

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

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

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

9.0 EVALUATION CRITERIA AND RELATIVE WEIGHTS

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

9.1 Proposal Delivery and Organization

Offeror is to organize the Proposal in the following format:

1) To comply with Government code chapter 2269.059 your submittal must be sealed before delivery. Provide the requirements listed below in the order provided.

1.1 Provide with the Proposal Base Bid Form (Submit in Bonfire Proposal Bid Form Section):

- Addenda Acknowledgment Sheet
- Bid Bond
- Proposal Base Bid Form

1.2 Provide the district and statute required forms in Bonfire Under Required Forms Section:

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

1.3 For Proposals Formal Submission: Provide in Each Section in Bonfire as listed below. Provide information that details the evaluation response for each of the following criteria. Must be in the location specified in Bonfire.

- Section ONE (**Offeror's Experience and Reputation**)

- Section TWO (**Quality of the Offeror's Goods and Services**)
- Section THREE (**Offeror's Proposed Personnel**)
- Section FOUR (**Other Relevant Factor- Plan and Schedule**)

1.5 **Financial Section** (Submit in Bonfire Offeror's Financial Section) "**Financial stability and bonding capacity**" (all financial information provided in Bonfire is confidential)

1.6 **Safety plan and safety record**" (Submit in Bonfire Safety Manual Section)

1.7 **Alternate Bid Proposal Submission (**Submit in Bonfire Package "B" Section)

- Alternate Bid Proposal Form
- Deviation Form (if Applicable)

1.8 **SBEP commitment**" submission (Submit in Bonfire Package C Section)

9.2 Relative Weights

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

1) "The Price"

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

1.1) Proposed construction contract price (base price plus alternates as defined on the bid form). Contract price shall include both base price and accepted alternate price as defined on the bid form. The final weighting distribution will be a calculated percentage.

1.2) No deviations are allowed in the base bid or base bid adjustment. Any deviation from the Base Bid shall be submitted as Alternate No. 2 on the Deviations Form.

1.3) Evaluation of the proposed substitutes/deviations does not constitute Owner's acceptance of the substitutes/deviations but can be considered during negotiations.

1.4) Price scores will be based on the base bid +/- the base bid adjustment which must be in adherence to all plans and specifications published.

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

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

2.1) Provide three (3) letters of reference for projects completed in the past **one (1) year** from major suppliers and/or sub-contractors which specifically address the bidder's history of paying sub-contractors and material providers on time.

2.2) List current or past FBISD projects completed within the past **five (5) years** of similar scope and size.

2.3) List current or past projects with other school district completed within the **past five (5) years** of similar scope and size.

2.4) Letters of reference from Director of Facilities/Operations/Maintenance & from campus on housekeeping and cleanliness from FBISD and/or other school district

2.5) The district staff will contact the Owners, identified in the list of current 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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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

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.

   _____

   _____

   _____

   _____

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***

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: _____

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

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

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:_____

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____

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.

OFFICE USE ONLY

Date Received

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.

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 ORIGIONAL SUBMISSION PACKAGE

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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

Confidential Copyrighted Information *(Required)*

General Provisions Part III Paragraph 13

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

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

_____	_____
Company	Authorized Representative (Print)
_____	_____
Signature	Date

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

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

Name	Title
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

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

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

Form provided by Texas Ethics Commission | www.ethics.state.tx.us | Adopted 10/5/2015

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.

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:_____

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

RETURN THIS DOCUMENT IN FRONT OF ORIGIONAL SUBMISSION PACKAGE

Addenda Acknowledgement *(Required)*

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

Name:_____

Signature:_____

Date:_____

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: *(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:

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:

FBISD
INSPIRE • EQUIP • IMAGINE

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.

Insurance Required	**Limit Required**
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.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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

Insurance Conditions

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

All certificates must include:

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

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

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

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

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

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

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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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FORT BEND INDEPENDENT SCHOOL DISTRICT
GENERAL PROVISIONS
Reference Document Version
Effective Date of July 1, 2023

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

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.

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.

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.

2.3.5. Unless otherwise indicated within the Solicitation, the period of acceptance shall be no earlier than one-twenty (120) District Business Days from receipt and approval.

2.3.6. In order for a price list to be changed, if permitted by the Contract terms, a new or amended price list must be submitted to the District's Purchasing Department by the Vendor and approved in writing by the FBISD Buyer within the Contract time specified prior to the requested price change. Otherwise, the last FBISD approved price list remains in effect until such time that FBISD approves the price change. Price changes will not be approved without vendor's documentation supporting cause for increase.

2.3.7. All prices and discount percentages in Vendor's response shall be firm for the term of this Contract. All price changes for products and/or services provided under this Contract must be approved, in writing, by FBISD prior to taking effect and in the same format as was accepted in Vendor's original response.

2.3.8. If the Solicitation includes the option to extend for additional year(s), price increases for each additional year may be negotiated not to exceed the Consumer Price Index (CPI) in the FBISD area at the time of renewal. Prices may be negotiated to prices below the current pricing.

2.3.9. Vendor agrees to promptly lower the proportionate price of any product purchased through this Contract following a reduction in the price the Vendor is paying suppliers.

2.3.10. Prices for this type of Contract cannot be increased during the first year of the contract. For periods beyond year one, prices cannot be increased for 30 days after the Contract renewal commences unless otherwise specified in the Solicitation. Price reductions shall be offered immediately upon becoming available to a Vendor at any time after award.

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

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

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

2.3.11. ***Pricing, Purchase Orders, Invoices, and Payments***

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

3. **CONFLICT OF INTEREST**

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

3.1.1. Any individual or business entity that contracts or seeks to contract for the sale or purchase of property, goods, or services with FBISD must file a Vendor Conflict of Interest Questionnaire with the FBISD Purchasing Office in accordance with Texas Local Government Code Chapter 176, and in the event that a conflict arises, no later than the 7th business day after the recipient becomes aware of facts that require filing.

3.1.2. This requirement applies to a person who is an agent of a vendor in the Vendor's business with the District. The Texas Ethics Commission's website at: www.ethics.state.tx.us/data/forms/conflict/CIS.pdf

3.2. ***Employee***

3.2.1. Pursuant to FBISD Policy CH (Local) Purchasing and Acquisition, and DBD (Local) Employment Requirements and Restrictions, all Vendors must disclose the name of any FBISD employee who owns, directly or indirectly, an interest in the Vendor's firm or any of its branches.

3.2.2. Failure to provide such conflict-of-interest information may be grounds for disqualification of the Solicitation Response or cancellation of a contract resulting from this Solicitation.

3.2.3. Purchase of services or equipment from a business owned in whole or in part by a District employee shall be permitted only when approved by the Superintendent and executed through a documented competitive process.

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

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

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

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.

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

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 Reponses 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

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**

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.

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 Reponses;
   - 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.

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.

PART V

CONTRACT TERMS, CONDITIONS, AND REQUIREMENTS

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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.

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 INTELELCTUAL 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.

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

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**

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.

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

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.

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 crise, 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

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.

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 Section2274.002 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 Section2274.002 of the Texas Government Code (relating to

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

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-

day operations of the District.

4.3. ***Licensing and Certification***

4.3.1. If the Contract requires licensing and/or certification to perform services as required, the Contractor shall provide only qualified licensed / certified individuals to perform such tasks.

4.3.2. The Contractor must maintain any required licenses / certification for the duration of the Contract.

4.3.3. The District reserves the right to require the Contractor to show proof of licensing / certification at any time during the Contract Term.

4.4. ***Place and Condition of Work***

4.4.1. Services shall be provided/scheduled as specified or directed by the District.

4.4.2. The District shall provide the Contractor access to the sites where the Contractor is to provide the goods or perform the services as required.

4.4.3. The Contractor acknowledges that it has satisfied itself as to the nature of the District's service requirements and specifications, the location and essential characteristics of the work site(s) the quality and quantity of materials, equipment, labor and facilities necessary to provide the goods or perform the services, and any other condition or state of fact which could in any way affect performance of the Contractor's obligations under the Contract.

4.4.4. The Contractor releases and holds the District harmless from and against any liability or claim for damages of any kind or nature if the actual site or service conditions differ from expected conditions.

4.5. ***Compliance with Laws and Safety Regulations***

4.5.1. The Contractor, its Subcontractors, and their respective employees, shall comply fully with all applicable federal, state, and local safety and health laws, ordinances, rules and regulations in the performance of the services, including but not limited to those imposed by the District and by the Occupational Safety and Health Administration (OSHA), as well as applicable workers' compensation laws, minimum and maximum salary and wage statutes and regulations, prompt payment and licensing laws and regulations.

4.5.2. In case of conflict, the most stringent safety requirements shall govern.

4.5.3. The Contractor shall indemnify and hold the District harmless from and against all claims, demands, suits, actions, judgments, fines, penalties and liability of every kind arising from the breach of the Contractor's obligations under this paragraph.

4.6. ***Security and Background Investigations***

4.6.1. Prior to commencing any work under the Contract, if Contractor contracts with FBISD to provide services, Contractor must certify for each covered employee of Contractor who will have direct contact with students, Contractor has obtained, as required by Texas Education Code Section 22.0834: (a) state criminal history record information from a law enforcement or criminal justice agency or a private entity that is a consumer reporting agency governed by the Fair Credit Reporting Act (15 U.S.C. Section 1681 et seq.) for each covered employee of Contractor employed before January 1, 2008; and (b) national criminal history record information for each employee of Contractor employed on or after January 1, 2008. Contractor must also obtain similar certifications of compliance with Texas Education Code Chapter 22's requirements from any subcontractors on the form provided herein. Covered employees with disqualifying criminal history are prohibited from serving at FBISD; Contractor and any subcontracting entity may not permit a covered employee to provide services at a school if the employee has been convicted of a felony or misdemeanor offense that would prevent a person from being employed under Tex. Educ. Code § 22.085(a) (i.e., Title 5 felony or an offense requiring registration as a sex offender and victim was under 18 years of age or was enrolled in a public school at the time the offense occurred).

4.6.2. The Contractor shall be responsible for ensuring the District is protected from potential threats that may be created by their employees.

4.6.3. If directed by the laws of the State of Texas, the Contractor shall adhere to any requirements that may be legislated during the term of any Contract, or any enacted District policy.

4.6.4. The District will have the right to require Contractor's principles, Contractor's employees assigned to the Contract Award, Subcontractor's principles, and Subcontractor's employees assigned to the Contract, and any other individuals deemed to be providing goods or services for the District to be investigated (including fingerprinting) for criminal records and/or history.

4.6.5. The District reserves the right to prevent, forbid, and/or temporarily or permanently bar Contractor, Contractor's employees, Subcontractors, or Subcontractor's employees from any District facility for

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whatever security reason it determines necessary to maintain the safety of District employees and operations.

4.7. ***Subcontracts*** Where a Subcontract may be used, the Contractor shall be fully responsible to the District for all acts and omissions of the Subcontracts just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract shall create for the benefit of any such Subcontract any Contractual relationship between the District and any such Subcontract, nor shall it create any obligation on the part of the District to pay or to see to the payment of any moneys due any such Subcontract except as may otherwise be required by law.

4.8. ***District Policy for Work Attire***. The Contractor, its employees, and Subcontractor employees shall not wear any T-shirts or clothing that has offensive language, pictures, or signs. The District prefers Contractors, its employees and subcontractors to wear uniforms with identification badges when on District premises.

4.9. ***Insurance for Services Performed***

4.9.1. ACORD Certificate of Insurance. Prior to providing services as a result of a Contract Award, the Contractor shall provide the District with a completed ACORD Certificate of Insurance providing the below listed coverage or such coverage as may be required in the Solicitation.

Type	Limit
Automobile Liability (Auto) - Covering 'Any Auto'	$1,000,000 Combined Single Limit ($5,000,000 if "For-Hire" motor carrier service)
Comprehensive General Liability (CGL) Including Products, Completed Operations, Independent Contractors, Broad Form Property Damage, Pollution and Blanket Contractual Liability coverages. XCU exclusions to be removed when underground work is performed.	$1,000,000 Occurrence $2,000,000 Aggregate $1,000,000 Personal Injury $ 500,000 Fire Damage $ 5,000 Medical Payments
Professional Errors & Omissions Liability (E & O) may be required from all contractors and licensed or certified as professionals; e.g., engineers, architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	One-time project amount. $1,000,000 Occurrence and Aggregate minimum $5,000,000 Maximum Limit Retroactive Date preceding date of contract must be shown Extended Reporting Period three (3) years past completion
Workers' Compensation (WC) Limits to comply with the requirements of the Texas Workers' Compensation Act Employers Liability	Statutory Limits $1,000,000
Umbrella or Excess Liability Excess of primary General Liability, Automobile Liability and WC Coverage B May be required for prime construction contractors May be required for non-construction contractors and licensed or certified as professionals; e.g., engineers, architects, insurance agents, physicians, attorneys, banks, financial consultants, etc.	 100% of Contract Amount for all contracts exceeding $100,000, up to $25,000,000 max $5,000,000
Sex Molestation/Abuse Required when service performance permits direct, unsupervised access to students.	$100,000 per claim/$300,000 aggregate

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.

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

FBISD
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BUSINESS & FINANCE

CONFLICT OF INTEREST QUESTIONNAIRE

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

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

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

FBISD Board of Trustees include:

Ms. Kristin K. Tassin, President

Mr. Adam Schoof

Dr. Shirley Rose Gilliam

Ms. Angie Hanan

Ms. Sonya Jones

Mr. Rick Garcia, Vice President

Mr. David Hamilton, Secretary

Dr. Marc Smith, Superintendent

Current Local Government Officers includes:

Kathleen Brown, Deputy Superintendent

Dr. Jaretha Jordan, Deputy Superintendent

Beth Martinez, Deputy Superintendent

Coby Wilbanks, General Counsel

Glenda Johnson, Chief Human Resources Officer

David Rider, Chief of Police

Kwabena Mensah, Chief of Staff

Damian Viltz, Chief Operations Officer

Rhonda Mason , Asst Superintendent Elem

Dr. Stephen Warford, Asst Superintendent Sec

Antignolo Matthew, Exec Dir Child Nutrition

Pandit Payal, Exec Dir Collab Communities Daniel

Bankhead, Exec Dir D & Construction Nunez

Wendy, Exec Dir Elementary Schools Mason

Rhonda, Exec Dir Elementary Schools

Ford Ida, Exec Dir Elementary Schools

Dr. Adam Stephens, Chief Academic Officer

kimberly Smith, Chief Communications Officer

Bryan Guinn, Chief Financial Officer

Long Pham, Chief Information Officer Morgan

Aaron, Exec Dir Facilities

Schlacks Kelly, Exec Dir Finance

Amber Williams, Exec Dir HR

Jojo Jacob Exec Dir Info Systems

Christopher Nilsson, Exec Dir Info Tech Service

Dr. Andria Schur, Chief of Schools

Williams Stephanie, Exec Dir Org Development

Elizabeth Williams, Exec Dir Secondary Schools

Lyons-Lewis, Deidra Exec Dir Sec. Schools

Westbrook Pilar, Exec Dir Sel & Comp.Health

Lisa Langston Exec Dir Student Affairs

Hill Deena, Exec Dir Student Supp Svc

Hubbard Melissa, Exec Dir Teach & Learning

Richard Gay, Exec. Dir. Business Services

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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.

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CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

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

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

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

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

OFFICE USE ONLY

Date Received

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

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

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

_____

Name of Officer

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

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

☐ Yes ☐ No

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

☐ Yes ☐ No

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

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

7

_____ _____

Signature of vendor doing business with the governmental entity Date

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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 <u>only</u> acceptable format for the Surety's Bonding Capacity Certification Letter.

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)

SECTION 00 31 00 AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 EXISTING CONDITIONS

A. Soil and Subsurface Investigations and Hazardous Material Surveys were conducted at the different project sites. The findings of these investigations and survey can be found in the following reports. These reports are provided as a courtesy for Contractor's convenience and are not a part of the Contract Documents.

B. Geotechnical Reports:
   1. 00 31 00.1 - Austin HS Final Report
   2. 00 31 00.2 - Dulles HS Final Report
   3. 00 31 00.3 - Elkins HS Final Report
   4. 00 31 00.4 - Willow Ridge HS Final Report
   5. 00 31 00.5 - Elkins HS Final Report
   6. 00 31 00.6 - Kempner HS Final Report
   7. 00 31 00.7 - Kempner HS Final Report
   8. 00 31 00.8 - Willow Ridge HS Final Report
   9. Copies of these reports are included as part of this project manual.
   10. These reports identify properties of below grade conditions and offers recommendations for the design of foundations.
   11. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
   12. Soil investigation data is provided only for the information and the convenience of the proposers. The Owner and Architect/Engineer disclaim any responsibility for the accuracy, true location and extent of the Soils Investigation that has been prepared by Others. They further disclaim responsibility for interpretation of that data by proposers, as in projecting soil-bearing values, rock profiles, soil stability and the presence, level and extent of underground water.
   13. This report, by its nature, cannot reveal all the conditions that exist on the site. Notify the Architect should subsurface conditions be found to vary substantially from this report.
   14. Proposers are urged to examine soils investigation data and to make their own investigation of the site before bidding.

C. Underground Radar Survey:
   1. Underground Radar Surveys were conducted at several schools.
   2. Copies of these documents are included as part of this section:
      a. 00 31 00.9
      b. 00 31 00.10
      c. 00 31 00.11
      d. 00 31 00.12
      e. 00 31 00.13
   3. AutoCad copies of the surveys are available from the Architect.
   4. The surveys identify properties and conditions of the existing facilities.
   5. The surveys shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
   6. Underground Radar Surveys are provided only for the information and the convenience of the proposers. The Owner and Architect/Engineer disclaim any responsibility for the accuracy, true location and extent of the survey that has been prepared by Others. They further disclaim responsibility for interpretation of that data by proposers.

7. The surveys, by their nature, cannot reveal all the conditions that exist on the site. Notify the Architect should conditions be found to vary substantially from the survey.
8. Proposers are urged to examine the surveys and to make their own investigation of the site before bidding.

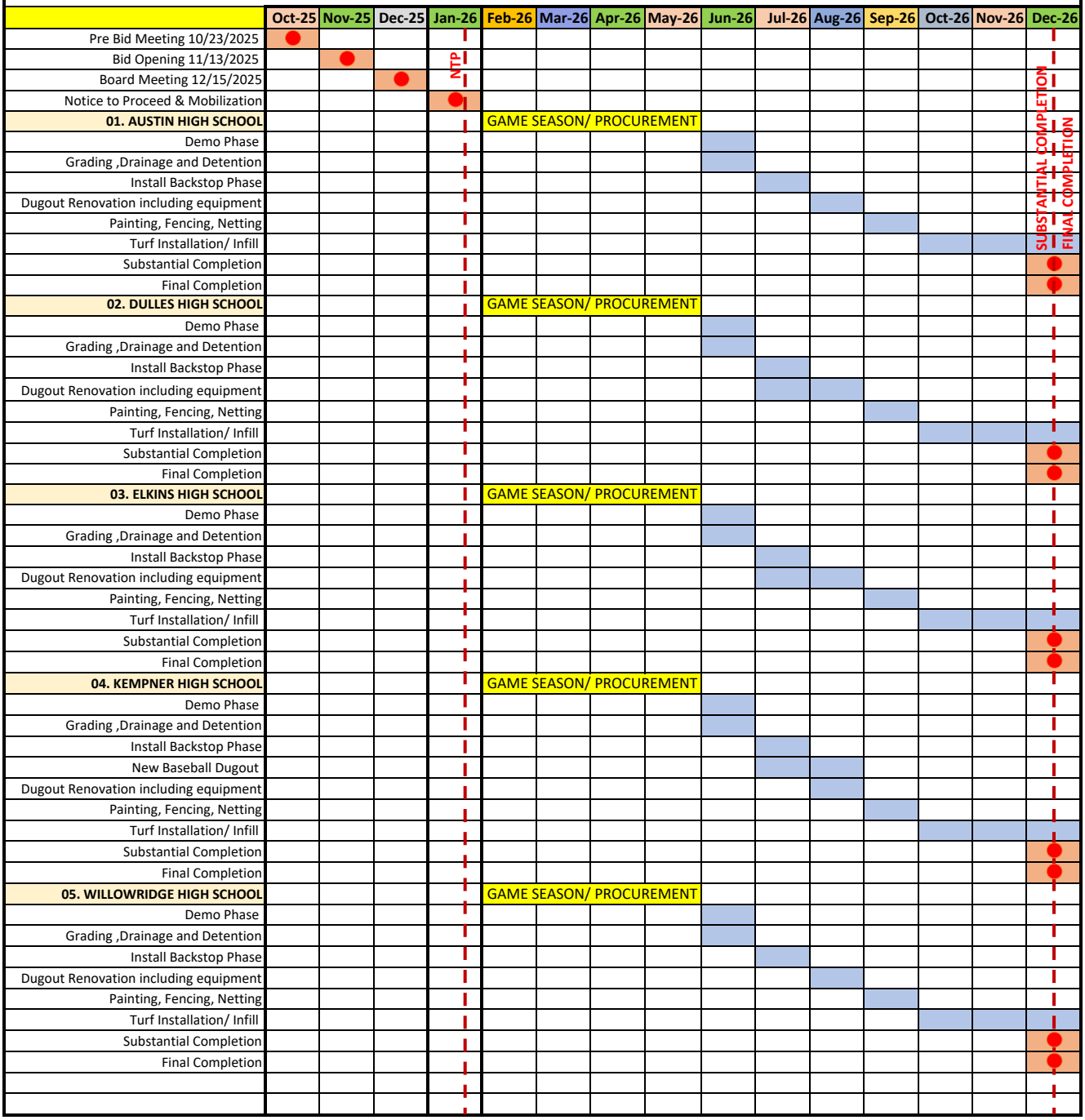
PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

CSP 26-021KB

Project Schedule



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GEOTECHNICAL INVESTIGATION

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
AUSTIN HIGH SCHOOL
3434 PHEASANT CREEK DRIVE
SUGAR LAND, TEXAS

Prepared for:
Fort Bend Independent School District
Sugar Land, Texas

by

Aviles Engineering Corporation
5790 Windfern
Houston, Texas 77041
713-895-7645

REPORT NO. G136-23A (Final)

February 2025

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

AVILES
ENGINEERING CORP.

February 28, 2025

Ms. Amanda Janek (Coggins)
Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

Reference: **Geotechnical Investigation**
Fort Bend Independent School District
BP012 - Athletic Facilities Renovations
Austin High School
3434 Pheasant Creek Drive
Sugar Land, Texas
AEC Report No.: G136-23A (Final)

Dear Ms. Janek,

Aviles Engineering Corporation (AEC) is pleased to present this report of the results of our geotechnical investigation for the above referenced project. The project terms and conditions were performed in accordance with the Master Agreement for Professional Services between Fort Bend Independent School District (FBISD) and AEC, dated August 21, 2023. The project scope of services is in accordance with AEC Proposal No. G2023-10-05R1, dated October 11, 2023.

AEC appreciates the opportunity to be of service to you. Please call us if you have any questions or comments concerning this report or when we can be of further assistance.

Respectfully submitted,
Aviles Engineering Corporation
(TBPELS Firm Registration No. F-42)





2/28/2025



Wilber L. Wang, P.E.
Senior Engineer

Hanie Joodat, Ph.D., P.E.
Project Engineer

Reports Submitted: 1 Fort Bend Independent School District (electronic)
1 File (electronic)

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CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

AVLES ENGINEERING CORP.

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APPENDIX A

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GEOTECHNICAL INVESTIGATION

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
AUSTIN HIGH SCHOOL
3434 PHEASANT CREEK DRIVE
SUGAR LAND, TEXAS

1.0 INTRODUCTION

1.1 General

The report submitted herein presents the results of Aviles Engineering Corporation's (AEC) geotechnical investigation for the Austin High School Athletic Facilities Renovations project, located at 3434 Pheasant Creek Drive in Sugar Land, Texas (Fort Bend County Key Map No.: 567 F), as part of the Fort Bend Independent School District (FBISD) 2023 Bond Program (FBISD Project No. BP012). A vicinity map of the project location is presented on Plate A-1, in Appendix A. AEC notes that the overall scope of the FBISD 2023 Bond Program (BP012) includes renovations of athletic facilities of three high schools: Austin High School, Dulles High School, and Hightower High School. This report, AEC Report No. G136-23A is for Austin High School. Recommendations for BP012 - Dulles High School are presented in AEC Report No. G136-23B and recommendations for BP012 - Hightower High School are presented in AEC Report No. G136-23C.

Based on preliminary information presented in schematic design drawings (dated November 9, 2023) prepared by Pfluger Architects, there are numerous improvements proposed for the athletics facilities at Austin High School. However, as indicated on the provided drawings, the improvements that will be covered by this geotechnical report are limited to: (i) reconstruction of the existing softball field, including new concrete masonry unit (CMU) dugouts, new press box, new hitting cage, 40 foot high netting around the field; (ii) reconstruction of the existing baseball field, including new 60 foot high netting around the field; and (iii) a new storage building (by the existing running track). According to information provided by FBISD, synthetic turf replacement at the softball field and baseball field has been deleted from this project.

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1.2 Purpose and Scope

The purpose of this geotechnical investigation is to evaluate the subsurface soil and groundwater conditions at the project site and develop geotechnical engineering recommendations for the proposed improvements. The scope of this geotechnical investigation is summarized below:

1. Drilling and sampling six geotechnical borings ranging from 10 to 25 feet below existing grade.
2. Engineering analyses and recommendations for foundation types, bearing depth, allowable bearing capacity, floor slab, and subgrade preparation for the softball field dugouts, press box, hitting cage and track storage building.
3. Engineering analyses and recommendations for foundation types and lateral resistance for softball field and baseball field netting poles.
4. Construction recommendations for the proposed improvements.

2.0 SUBSURFACE EXPLORATION

2.1 Soil Borings

Boring locations and depths at the project site and depths were indicated on the schematic drawings prepared by Pfluger Architects. Boring locations were staked in the field by AEC personnel using a handheld GPS unit. AEC drilled a total of six borings at the project site to depths ranging from 10 to 25 feet below existing grade. The approximate boring locations are shown on the Boring Location Plan on Plate A-2, in Appendix A. The total drilling footage is 116 feet. The boring locations were not surveyed after completion of drilling.

2.2 Drilling and Sampling Methods

Borings B-1 through B-6 were drilled using a truck-mounted drilling rig and were advanced using dry auger method. Undisturbed samples of cohesive soils were obtained from the borings by pushing 3-inch diameter thin-wall, seamless steel Shelby tube samplers in general accordance with ASTM D 1587. Granular soils were sampled with a 2-inch split-barrel sampler in accordance with ASTM D 1586. Standard Penetration Test resistance (N) values for these samples were recorded as “Blows per Foot” and are shown on the boring logs. Strength of the cohesive soils was estimated in the field using a hand penetrometer. The undisturbed samples of cohesive soils were extruded mechanically from the tube samplers in the field and wrapped in aluminum foil; all soil samples were sealed in plastic bags to reduce moisture loss and disturbance. The samples were then placed in core boxes and transported to the AEC laboratory for testing and further study.

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Groundwater readings were obtained during drilling and after completion of drilling. The boreholes were backfilled with bentonite chips upon completion of drilling.

3.0 LABORATORY TESTING PROGRAM

Soil laboratory testing was performed by AEC personnel. Samples from the borings were examined and classified in the laboratory by a technician under the supervision of a geotechnical engineer. Laboratory tests were performed on selected soil samples to evaluate the engineering properties of the foundation soils in accordance with applicable ASTM Standards. Atterberg limits, moisture contents, percent passing a No. 200 sieve, sieve analysis, and dry unit weight tests were performed on selected samples to establish the index properties and confirm field classification of the subsurface soils. Strength properties of cohesive soils were determined by means of unconfined compression (UC) and unconsolidated-undrained (UU) triaxial tests performed on undisturbed samples. The laboratory test results are presented on the representative boring logs (see Plates A-3 through A-8, in Appendix A). A key to the boring logs, classification of soils for engineering purposes, terms used on boring logs, and reference ASTM Standards for laboratory testing are presented on Plates A-9 through A-12, in Appendix A. Sieve analysis results are presented on Plate A-13, in Appendix A.

4.0 SITE CONDITIONS

4.1 Subsurface Conditions

Details of the soils encountered during drilling are presented in the boring logs on Plates A-3 through A-8, in Appendix A. Soil strata encountered in the borings are summarized below.

Boring	Depth (ft)	Description of Stratum
B-1	0 - 2	Fill: hard, Lean Clay (CL), with ferrous nodules
	2 - 10	Stiff to hard, Fat Clay with Sand (CH), with slickensides
	10 - 16	Stiff to very stiff, Fat Clay (CH), with slickensides
	16 - 25	Very loose to medium dense, Poorly Graded Sand with Silt (SP-SM)
B-2	0 - 4	Very stiff to hard, Sandy Fat Clay (CH), with slickensides
	4 - 10	Firm to hard, Lean Clay with Sand (CL)
	10 - 16	Very loose to loose, Silty Sand (SM)
B-3	0 - 6	Soft to hard, Sandy Fat Clay (CH), with slickensides
	6 - 10	Stiff to very stiff, Fat Clay with Sand (CH), with slickensides and calcareous nodules

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Boring	Depth (ft)	Description of Stratum
B-3 (cont.)	10 - 14	Very stiff, Fat Clay (CH)
	14 - 20	Loose to medium dense, Silty Sand (SM)
B-4	0 - 2	Very stiff, Lean Clay (CL), with ferrous and calcareous nodules
	2 - 8	Very stiff, Fat Clay with Sand (CH)
	8 - 10	Very stiff, Sandy Fat Clay (CH), with ferrous and calcareous nodules
	10 - 18	Stiff to hard, Lean Clay with Sand (CL)
	18 - 20	Loose, Silty Sand (SM), with lean clay pockets
B-5	0 - 6	Stiff to very stiff, Fat Clay (CH), with slickensides
	6 - 8	Stiff, Fat Clay with Sand (CH), with calcareous nodules and ferrous stains
	8 - 10	Stiff, Lean Clay with Sand (CL), with calcareous nodules and ferrous stains
B-6	0 - 6	Hard, Sandy Fat Clay (CH), with slickensides
	6 - 12	Stiff to hard, Sandy Lean Clay (CL)
	10 - 12	Firm to stiff, Sandy Silty Clay (CL-ML), with calcareous nodules
	12 - 16	Medium dense, Silty Sand (SM), with lean clay pockets
	16 - 22	Very loose to loose, Poorly Graded Sand with Silt (SP-SM)
	22 - 25	Loose, Silty Sand (SM)

Subsurface Soil Properties: The subsurface clayey soils encountered in the borings have medium to very high plasticity (see "Degree of Plasticity of Cohesive Soils" on Plate A-10, in Appendix A), with liquid limits (LL) ranging from 28 to 95, and plasticity indices (PI) ranging from 13 to 65. The cohesive soils encountered are classified as "CL" and "CH" type soils, and granular soils encountered are classified as "SM" and "SP-SM" type soils in accordance with ASTM D 2487. "CH" soils undergo significant volume changes due to seasonal changes in soil moisture contents. "CL" type soils with lower LL (less than 40) and PI (less than 20) generally do not undergo significant volume changes with changes in moisture content. However, "CL" soils with LL approaching 50 and PI greater than 20 essentially behave as "CH" soils and could undergo significant volume changes. Slickensides were encountered in most fat clay (CH) soils.

Groundwater Conditions: Groundwater levels encountered in the borings and the boring cave-in depths encountered in the borings during drilling are summarized in Table 1.

Table 1. Water Levels and Cave-in Depths in Borings

Boring No.	Date Drilled	Boring Depth (ft)	Boring Groundwater Depth (ft)	Boring Cave-in Depth (ft)
B-1	11/21/2023	25	15 (Drilling) 12 (15 Mins.) 12 (Complete)	12 (Drilling)

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Boring No.	Date Drilled	Boring Depth (ft)	Boring Groundwater Depth (ft)	Boring Cave-in Depth (ft)
B-2	11/21/2023	16	10 (Drilling) 8 (15 Mins.) 8 (Complete)	8 (Drilling)
B-3	11/21/2023	20	14 (Drilling) 14 (Complete)	14 (Drilling)
B-4	11/21/2023	20	Dry (Drilling) Dry (Complete)	Boring did not cave in
B-5	11/21/2023	10	Dry (Drilling) Dry (Complete)	Boring did not cave in
B-6	11/21/2023	25	14 (Drilling) 10 (15 Mins.)	10 (Drilling)

The information in this report summarizes conditions found on the date the borings were drilled. However, it should be noted that our groundwater observations are short-term; groundwater depths and subsurface soil moisture contents will vary with environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress.

4.2 Hazardous Materials

No signs of visual staining or odors were encountered during field drilling or during processing of the soil samples in the laboratory. However, AEC notes that the presence of potential hazardous material at other locations within the project area cannot be discounted based upon the very small and limited number of samples taken.

4.3 Subsurface Variations

It should be emphasized that: (i) at any given time, groundwater depths can vary from location to location, and (ii) at any given location, groundwater depths can change with time. Groundwater depths will vary with seasonal rainfall and other climatic/environmental events. Subsurface conditions may vary away from and in between the boring locations.

Clay soils in the Greater Houston area typically have secondary features such as slickensides, calcareous and ferrous nodules, and contain sand/silt seams/lenses/layers/pockets. It should be noted that the information in the boring logs is based on 3-inch diameter soil samples. In Borings B-1 and B-6, soil samples were obtained continuously at intervals of 2 feet in the top 20 feet of the borings, then at 5 feet intervals thereafter to the

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boring termination depth of 25 feet below grade. In Borings B-2 through B-5, soil samples were obtained continuously at intervals of 2 feet from the ground surface to the boring termination depths of 10 to 20 feet below grade. A detailed description of the soil secondary features may not have been obtained due to the small sample size and sampling interval between the samples. Therefore, while a boring log shows some soil secondary features, it should not be assumed that the features are absent where not indicated on the boring logs.

5.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Based on preliminary information presented in schematic design drawings (dated November 9, 2023) prepared by Pfluger Architects, there are numerous improvements proposed for the athletics facilities at Austin High School. However, as indicated on the provided drawings, the improvements that will be covered by this geotechnical report are limited to: (i) reconstruction of the existing softball field, including new CMU dugouts, new press box, new hitting cage, 40 foot high netting around the field; (ii) reconstruction of the existing baseball field, including new 60 foot high netting around the field; and (iii) a new storage building (by the existing running track).

AEC notes that detailed drawings of the proposed Austin High School athletics improvements were not available at the time this report was prepared. AEC should be notified once drawings become available so that the recommendations presented in this report can be updated as necessary.

Construction Specifications: AEC is not aware if there are specific construction specifications for FBISD projects. For this report, AEC has instead referred to City of Houston Standard Construction Specifications (COHSCS). AEC should be notified if different construction specifications should be used.

5.1 Softball Field Improvements

As noted in Section 5.0 of this report, AEC understands that the proposed improvements at the softball field include two new CMU dugouts, a new press box, a new hitting cage, and 40 foot high netting around the field. Based on the provided information, it appears that both of the dugouts will be at grade.

Soil and Groundwater Conditions: Based on Borings B-1 through B-3, the soil conditions at the softball field generally consist of approximately 10 to 16 feet of soft to hard fat/lean clay (CH/CL), underlain by very loose

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to medium dense silty sand (SM/SP-SM) to the boring termination depths of 16 to 25 feet below grade. Of particular note, soft clays were encountered at a depth of 8 to 10 feet in Boring B-2. Groundwater was encountered at depths of 8 to 15 feet below existing grade.

5.1.1 Building Foundations

Based on Borings B-1 through B-3, AEC notes that the top 10 feet of soil at the softball field generally consist of clay soils with PI that ranges from 33 to 56, which indicates a high to very high expansive potential (see Degree of Plasticity of Cohesive Soils on Plate A-10, in Appendix A).

AEC notes that highly expansive clays within the zone of seasonal moisture variation will experience significant amounts of shrink and swell movements as their moisture contents vary throughout the years. In order to mitigate the impact of the expansive clays, AEC recommends that the building foundations (for the dugouts, press box, and hitting cage) be placed below the zone of seasonal moisture variation (which is typically 10 feet below grade in the Greater Houston area). AEC therefore recommends the buildings should be supported on drilled and underreamed footings that are founded at a depth of at least 10 feet below existing grade.

Allowable Bearing Capacity and Footing Depth: Drilled and underreamed footings founded at a depth of approximately 10 feet below existing grade should be designed for an allowable bearing capacity of 1,900 pounds per square foot (psf) for sustained loads and an allowable bearing capacity of 2,850 psf for total loads. The allowable bearing capacities provided include a factor of safety (FS) of 3 for sustained loads and a FS of 2 for total loads. Whichever net allowable bearing capacity results in a larger footing diameter should be used for design.

Uplift Capacity: The drilled-and-underreamed foundations supporting the dugouts and hitting cages may be subject to uplift wind loads. According to O'Neill and Reese (1999), "Drilled Shafts: Construction Procedures and Design Methods", the uplift resistance of a drilled-and-underreamed footing in cohesive soils can be calculated as:

$$Q\ (\text{uplift}) = (s_u\ N_u\ A_u)/FS_1 + W_c/FS_2 + W_s/FS_3 \quad \text{.....Equation (1)}$$

$$N_u = 1.5\ D_b / B_b \quad \leq 9 \quad \text{.....Equation (2)}$$

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where:
- Q = Allowable uplift resistance of a drilled footing (lbs).
- s_u = Average undrained shear strength of the cohesive soil between the base of the bell and 2 B_b above the base; use s_u = 1,000 psf, based on Borings B-1 through B-3.
- N_u = Bearing capacity factor for base uplift resistance, $N_u \leq 9$.
- D_b = Depth of base below ground surface minus the seasonal moisture change zone for a drilled and underreamed footing (ft). The seasonal moisture change zone in the Greater Houston area can be considered as 10 feet below the existing ground surface.
- B_b = Diameter of the bell (ft).
- B_s = Diameter of the shaft (ft).
- W_c = Effective weight of concrete footing (lbs).
- W_s = Effective weight of projected soil above the bell, lbs (use unit weight, γ = 120 pcf for soils above water table, and buoyant unit weight γ' = 60 pcf for soils below water table).
- A_u = $\pi/4$ (B_b^2 - B_s^2), projected area of bell over shaft (ft^2).
- FS_1, FS_2, FS_3= Factors of Safety for uplift resistance.

We recommend that the following safety factors be used for uplift design: safety factor of 2.0 for soil cohesion (FS_1 = 2), safety factor of 1.1 for dead weight of footing (FS_2 = 1.1), and safety factor of 1.5 for weight of soil above the bell (FS_3= 1.5). Based on above equations, the uplift resistance of a drilled-and-underreamed footing can be increased by extending the founding depth of the footing or increasing the diameter of the bell.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each footing should contain reinforcing steel throughout its full length to sustain an uplift load of at least 52d kips, where "d" is the diameter of the shaft in feet.

Footing Spacing: To reduce stress overlap from adjacent footings and potential construction problems, the minimum edge-to-edge clear spacing between the underreams should not be less than 0.6 x diameter of the larger underream.

Footing Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered and the anticipated structural loads, we estimate that drilled-and-underreamed footings, designed and constructed as recommended in this report, will experience total settlements on the order of 1 inch.

Drilled-and-Underreamed Footing Construction: Drilled-and-underreamed footings should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each footing excavation prior to placing concrete to insure that:

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1) The footing has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report;
2) The column is concentric with the pier cap/grade beam and drilled footing; and
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

There is a possibility that slickensides and/or pockets/seams of sands/silts within the clay soils may make underreaming (belling) difficult and result in potential sloughing or caving-in of the shaft excavation sidewalls during construction, particularly for underreams over 6 feet in diameter. We recommend that a maximum diameter ratio of bell to shaft not exceed 2 to 1.

Based on Borings B-1 through B-3, AEC anticipates that the drilled and underreamed footings will be excavated within soft to hard lean/fat clay (CL/CH) soil. Based on Table 1 in Section 4.1 of this report, groundwater encountered in the borings was at a level just within (in Boring B-2) or just below (in Borings B-1 through B-3) the proposed footing depths of 10 feet below grade. In addition, the site's groundwater level will fluctuate with seasonal rainfall and other climatic events, and may be higher at the time of construction. If ground water is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. However, if significant sloughing or caving occurs during shaft excavation (**which has a higher risk of occurring particularly in the vicinity of Boring B-2**), further excavation should be stopped and a reduced bell/shaft ratio or even straight-sided shafts (matching the bell diameter) in combination with bentonite slurry and/or temporary casing may be necessary.

Placement of concrete should be accomplished immediately after excavation is completed to reduce potential for sloughing of the foundation soils. Footing excavations should not be left open overnight. No concrete should be placed without the prior approval of FBISD's Representative. New drilled footings should not be excavated within 2 bell diameters or 15 feet (edge to edge), whichever is larger, of an open footing excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled footing to an adjacent unfilled footing.

5.1.2 Building Floor Slabs

AEC assumes that the dugouts and the press box will have a floor slab that will be at or near existing grade.

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AEC is not aware if a floor slab will be used for the hitting cages, but the recommendations presented in this section of the report can be used for the hitting cages as well, if necessary. AEC should be notified if the finished floor elevations (FFE) of the dugouts, press box, or hitting cages will be more than 6 inches higher than existing grade, so that our recommendations can be adjusted as necessary.

Estimated Soil Movements: Potential Vertical Rise (PVR) is an estimate of the potential of an expansive soil to swell from its current state. PVR was computed using TxDOT test method Tex-124-E. Based on Borings B-1 through B-3, the existing soil in the softball field area is highly expansive. Expansive clays exhibit a potential to shrink and swell with changes in their moisture contents. The changes in the soil moisture content are usually caused by variations in the seasonal amount of rainfall and evaporation rates or other localized factors like the moisture withdrawal by nearby trees. The seasonal moisture active zone generally extends to about 10 feet below ground in the Greater Houston area, and will be deeper if trees with deep root zones exist adjacent to the structures.

Additional movements can occur in areas if water is allowed to pond during or after construction on soils with high plasticity, or if highly plastic soils are allowed to dry out prior to fill or concrete placement. High plasticity clay may also experience shrinkage during periods of dry weather as moisture evaporation occurs at the ground surface and the groundwater table drops. The actual PVR of the site will be highly dependent upon the actual PI and moisture regime of the clayey soils at the time of construction. Therefore, uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure is critical to reducing potential shrink-swell movement of the floor slab.

PVR: For the top 10 feet of the existing soils encountered in Borings B-1 through B-3, the PVR of the various structures at the softball field area is approximately 2.4 to 4.5 inches based on in-situ moisture conditions.

Table 2. Estimated PVR vs. Thickness of Replacement Fill for Softball Field Buildings

Thickness of Replacement Fill Beneath the Existing Ground Surface (ft)	High Limit PVR (in), based on Boring B-1	Low Limit PVR (in), based on Boring B-2
0	4.5	2.4
1	4.0	2.1
2	3.5	1.8
3	2.8	1.5
4	2.1	1.2

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Thickness of Replacement Fill Beneath the Existing Ground Surface (ft)	High Limit PVR (in), based on Boring B-1	Low Limit PVR (in), based on Boring B-2
5	1.6	0.9
6	1.1	0.7
7	0.7	0.5

Floor Slab: AEC understands that the PVR requirement for buildings is typically considered to be 1 inch. In accordance with Table 2, a minimum of 4.5 to 6.5 feet of soil excavation would be required to reduce the PVR of the softball field buildings to 1 inch.

For the softball field buildings, AEC recommends the following floor slab options be considered: (i) Option 1 - a structural floor slab supported on drilled and underreamed footings with a 8 inch void space between the bottom of the slab and the top of the subgrade soils; (ii) Option 2 - a subgrade supported floor slab, with 4 feet excavation and replacement of existing soils beneath the slab; or (iii) Option 3 - a subgrade supported floor slab, with treatment of the underlying soils by injecting an ionic soil stabilizer (ISS) to a depth of 10 feet.

5.1.2.1 Option 1 - Structural Floor Slab

The most effective method to mitigate movement of subgrade soils due to shrink-swell cycles of expansive soils is construction of a drilled-footing supported structural floor slab with 8 inch carton forms between the bottom of the slab and the top of the subgrade soil.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

The exposed subgrade should then be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with clean onsite

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clay soils. Afterwards, general fill can be placed and compacted to achieve the elevation at the bottom of the carton forms. General fill recommendations are presented in Section 5.4.3 of this report.

Grade Beams: We recommend that foundation grade beams be founded at least 24 inches below FFE. The grade beams should be constructed on 8 inch carton forms. Care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. AEC recommends that Motz blocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. The drilled-and-underreamed footings and beams should be tied together.

Moisture Barrier: To prevent mildew or mold growth on the underside of the structural floor slab, we recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab (on top of the carton forms).

5.1.2.2 Option 2 - Subgrade Supported Floor Slab

In accordance with Table 2 in Section 5.1.2 of this report, approximately 4.5 to 6.5 feet of existing soil would have to be removed and replaced with low-expansive select fill in order to achieve a PVR of 1 inch, which is most likely cost-prohibitive and impractical. In addition, thick layers of compact fill will also experience vertical and differential settlement of the fill over time. Instead of excavating 4.5 to 6.5 feet of existing soil, a concrete slab-on-grade in conjunction with *limited* (i.e. 4 feet) fill replacement can be considered as an alternative to full-depth replacement, if FBISD is willing to take some risk of floor slab movement. This option assumes that uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure are maintained adequately, and that any resultant movements can be adequately sustained by the subgrade soils and foundation system.

It is AEC's experience that the majority of imported "select" fill that is being excavated from borrow pits in the Houston area is poor quality that does not meet AEC's select fill specifications (see Section 5.4.2 of this report). Imported "select fill" material typically has a high sand/silt content combined with large clay boulders/chunks and is not homogenous. This material is permeable, which will allow surface water to infiltrate through it and cause both the clay boulders within the fill to swell, and will also penetrate through

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the sand/silt and then cause the underlying natural clay soils to swell as well, resulting in significant floor slab movement and cracking.

Based on the expansive soils encountered in Borings B-1 through B-3 at the softball field, **AEC prefers the use of lime-stabilized clay fill for this project over using imported "select" fill for the soil replacement beneath a subgrade supported floor slab for this site. If FBISD decides to use select clay fill instead of lime-stabilized clay fill, AEC cautions that stringent quality control (QC) over select clay fill material imported to the site should be observed**, both by FBISD's inspectors and the onsite Construction Materials Testing (CMT) laboratory. Without proper QC, there is a risk that substandard select fill will either have a higher than allowed expansive potential or a higher than allowed sand content, both of which will result in potential long term issues for the floor slab performance.

Using the lime stabilized clay soil will be beneficial for the overall performance of the building floor slab because: (i) it will reduce the potential for surface water to enter into the highly expansive natural clay soils beneath the building pad which in turn will reduce the potential for the subgrade clays to shrink and swell; (ii) it will be subject to less vertical and differential settlement as the fill consolidates over time; and (iii) it will provide a competent working surface during construction of the building pad. Lime-stabilized clay recommendations are presented in Section 5.4.1 of this report.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

After surface stripping, an additional 3.5 feet (i.e. total depth of 4 feet, which includes the 6 inches of surface removal) of existing soils should be removed. After the overburden is excavated, the exposed subgrade should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted lime-stabilized soils as necessary. After proof rolling is performed, either compacted lime-stabilized clay fill or compacted select clay fill should then be used to achieve the bottom of the building floor slab. Lime-stabilized clay fill and select clay fill recommendations are presented in Sections 5.4.1 and 5.4.2 of this report, respectively.

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According to Table 2 in Section 5.1.2 of this report, the PVR for 4 feet of soil replacement will still be 1.2 to 2.1 inches. FBISD should be aware that some risk of floor slab movement is still present if this floor slab option is selected. If conditions which exacerbate moisture variations such as the presence of trees, poor drainage, excessive drying/wetting of subsurface soils, or leaking underground utilities are located nearby, the floor slab total vertical movements and net differential vertical movements could be higher than estimated.

Grade Beams: We recommend that foundation grade beams be founded at least 30 inches below FFE. The grade beams can be constructed on 8 inch carton forms. If carton forms are used (at the discretion of the building designer), care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. If carton forms are used, AEC recommends that Motz blocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. If no carton forms will be used, we recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings and beams should be tied together.

Floor slabs are typically structurally tied to the grade beams. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.1.2.3 Option 3 - Inject Ionic Soil Stabilizer

Option 3 also includes a subgrade supported floor slab; however, in order to limit the PVR impact on the floor slab, the existing expansive clay soils within the building footprint can be injected with an ISS to a minimum depth of 10 feet (without requiring over-excavation of existing soil, as presented in Option 2 in Section 5.1.2.2 of this report). Injection of a liquid ISS, such as Earthlok Soil Stabilizer (or equivalent product), should be able to reduce the potential of the expansive clay soils from experiencing shrink and swell movements and

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therefore prevent the building floor slab from experiencing distress in the future due to movement of expansive soils. However, although research has been conducted to determine the effectiveness of ionic clay soil stabilization, this treatment method has not yet achieved widespread acceptance and no national standard (by the federal government or professional civil engineering body) is currently available. **The effectiveness of injecting liquid ISS in an effort to reduce the expansive potential of clay soils cannot be guaranteed by AEC**, especially in regard to: (i) the ability of the ISS to render the clay effectively inert; and (ii) for the ISS to adequately penetrate/permeate vertically and horizontally throughout the clay mass. **If the ISS injection treatment method is used, AEC will accept no liability regarding its effectiveness to reduce/prevent shrink and swell movements of expansive clay soils, or on the long-term performance of the building floor slabs (and any floor slab distress that could potentially occur)**.

AEC notes that an injection depth of 10 feet should be able to cover existing expansive clay soils within the moisture active zone; if treatment is effective, then the anticipated PVR of the floor slab should be on the order of 1 inch, or less. AEC suggests that the grid spacing of the injection points be close enough to ensure that the expansive clay soils within the treatment area be adequately treated; some degree of overlap between treated soil columns is recommended. However, the ultimate determination of treatment area, injection spacing, treatment depth, as well as means and methods for liquid ISS injection shall be by the ISS Contractor.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The exposed subgrade should then be proof-rolled, in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted general fill. After proof-rolling, the ISS can be injected to a minimum depth of 10 feet below grade; the center to center spacing of the ISS injections should be determined by the ISS provider.

Testing: AEC understands that Earthlok requires that geotechnical soil testing be performed after soil stabilization is completed for warranty purposes. AEC recommends that soil borings be performed to a depth of 10 feet within the ISS treated areas. Recommended laboratory tests include, but are not necessarily limited to moisture contents, Atterberg Limits, and swell tests. Frequency of borings and laboratory testing can be determined once the ISS treatment is completed. The additional borings and testing can be performed by

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either AEC or a Construction Materials Testing (CMT) laboratory, although AEC must be allowed to review the test results if the testing is performed by a different CMT laboratory.

Grade Beams: We recommend that foundation grade beams be founded at least 30 inches below FFE. We recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings and beams should be tied together.

Floor slabs are frequently structurally tied to the grade beams, although this will be at the building designer's discretion. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements, and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.1.3 Netting Pole Foundations

Based on information provided by FBISD, the netting pole configuration will consist of a 12 foot high CMU block wall at grade with the 40 foot high poles extending through the block wall.

Based on the soil conditions encountered in Borings B-1 through B-3, AEC recommends that the netting poles and CMU block wall around the softball field be supported on straight sided drilled shafts; AEC anticipates that shaft lengths may be between 10 and 15 feet deep; however, the shaft length shall be determined be the netting pole designer. AEC anticipates that straight shaft design for the netting poles and CMU block wall will be predominantly based on lateral resistance to wind and other lateral loads. However, AEC recommends that the straight sided drilled shafts extend a minimum of 10 feet deep, regardless of the length required to resist lateral loads (see below).

Allowable Bearing Capacity: Based on the soil conditions encountered in Borings B-1 through B-3, end bearing straight sided drilled shafts founded at a minimum depth of 10 to 15 feet below existing grade should be designed for a net allowable bearing capacity of 2,000 psf for sustained loads and 3,000 psf for total loads.

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Whichever net allowable bearing capacity results in a more conservative shaft diameter should be used for design. The allowable bearing capacities provided include a FS of 3.0 for sustained loads and a FS of 2.0 for total loads.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each shaft should contain reinforcing steel throughout its full length to sustain an uplift load of at least 52d kips, where "d" is the diameter of the shaft in feet.

Lateral Capacity: The minimum required shaft embedment depth (for lateral load support), under non-constrained condition (free-head condition) and with maximum lateral deflection of 0.5 inch at the shaft head, can be calculated based on the following equations [2018 International Building Code (IBC), Section 1807.3.2.1]:

$$D_{min} = 0.5A[1 + (1+4.36h/A)^{½}] \quad \text{.....Equation (3)}$$

$$A = 2.34V/(S_1B) \quad \text{.....Equation (4)}$$

where, D_{min} = minimum required depth of shaft embedment (ft).
V = applied lateral shear load (wind load) (lbs).
h = vertical distance from ground surface to point of application of V (ft).
B = diameter of drilled shaft (ft).
S_1 = allowable lateral soil pressure at z, $S_1 = 100*z$ (per 2018 IBC Table 1806.2), lb/ft^2; an increase of one-third (i.e., $S_1 = 133*z$) is permitted when considering load combinations, including wind or earthquake loads, as permitted by 2018 IBC Section 1806.2.
z = $D_{min}/3$, depth below the ground surface (use a maximum value of 12 feet for z) (ft).

AEC should be notified if LPile soil parameters are required for drilled shaft lateral resistance design.

Drilled Shaft Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered, we estimate that straight sided drilled shafts designed and constructed as recommended will experience total settlements within 0.5 inches.

Straight Sided Drilled Shaft Construction: Straight sided shafts should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each shaft excavation prior to placing concrete to insure that:

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1) The drilled shaft has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report.
2) The column is concentric with the drilled shaft.
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

Based on Borings B-1 through B-3, AEC anticipates that the straight sided drilled shafts will be excavated within soft to hard lean/fat clay (CL/CH) soil to a depth between 10 and 14 feet and very loose to medium dense silty sands (SM/SP-SM) may be encountered between a depth of 10 and 15 feet.

As noted in Table 1 in Section 4.1 of this report, it is likely that the drilled shaft excavations will encounter groundwater. AEC anticipates that groundwater seepage into minimum 10 feet deep shaft excavations will be relatively low, but the likelihood of groundwater infiltration into the shafts increases significantly for shafts greater than 10 feet deep. The groundwater level at the site will fluctuate with seasonal rainfall and other climatic events and may be higher at the time of construction. If groundwater is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. If significant sloughing or caving occurs during shaft excavation (**the likelihood increases significantly for shafts greater than 10 feet long**), a temporary steel casing and/or bentonite slurry may be necessary to keep the shaft sidewalls intact.

New drilled shafts, if any, should not be excavated within 3 shaft diameters (edge to edge) of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled shaft to an adjacent unfilled shaft. Placement of concrete should be accomplished immediately after excavation is completed to reduce changes in the state of stress and possible sloughing in the foundation soils. No shafts should be left open overnight or poured without the prior approval of the Owner's Representative.

In addition, each drilled shaft excavation should be inspected by a qualified Owner's Representative prior to placing concrete, to check that (1) the shaft excavation has been constructed to the specified dimensions at the recommended depth and formation and (2) excessive cuttings and any soft-compressible materials have been removed from the bottom of the excavation.

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5.2 Baseball Field Improvements

As noted in Section 5.0 of this report, AEC understands that the proposed improvements at the baseball field include 60 foot high netting around the field. Synthetic turf will also be installed; recommendations for synthetic turf is presented in Section 5.3 of this report.

Soil and Groundwater Conditions: Based on Borings B-4 and B-5, the soil conditions at the baseball field generally consist of approximately 10 to 18 feet of stiff to hard fat/lean clay (CH/CL), plus approximately 2 feet of loose silty sand (SM) at a depth of 18 feet in Boring B-4. Groundwater was not encountered in the borings.

5.2.1 Netting Pole Foundations

Based on information provided by FBISD, the netting pole configuration will consist of a 12 foot high CMU block wall at grade with the 60 foot high poles extending through the block wall. General recommendations for netting pole foundations are presented in Section 5.1.3 of this report.

Based on the soil conditions encountered in Borings B-4 and B-5, AEC recommends that the netting poles and CMU block wall around the baseball field be supported on straight sided drilled shafts; AEC anticipates that shaft lengths may be between 10 and 15 feet deep; however, the shaft length shall be determined be the netting pole designer. AEC anticipates that straight shaft design for the netting poles and CMU block walls will be predominantly based on lateral resistance to wind and other lateral loads. However, AEC recommends that the straight sided drilled shafts extend a minimum of 10 feet deep, regardless of the length required to resist lateral loads (see below).

Allowable Bearing Capacity: Based on the soil conditions encountered in Borings B-4 and B-5, end bearing straight sided drilled shafts founded at a minimum depth of 10 to 15 feet below existing grade should be designed for a net allowable bearing capacity of 2,500 psf for sustained loads and 3,750 psf for total loads. Whichever net allowable bearing capacity results in a more conservative shaft diameter should be used for design. The allowable bearing capacities provided include a FS of 3.0 for sustained loads and a FS of 2.0 for total loads.

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Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each shaft should contain reinforcing steel throughout its full length to sustain an uplift load of at least 44d kips, where "d" is the diameter of the shaft in feet.

Lateral Capacity: The minimum required shaft embedment depth (for lateral load support), under non-constrained condition (free-head condition) and with maximum lateral deflection of 0.5 inch at the shaft head, can be calculated based on Equations (3) and (4) in Section 5.1.3 of this report. However, S_1 can be taken as 150*z psf. AEC should be notified if LPile soil parameters are required for drilled shaft lateral resistance design.

Drilled Shaft Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered, we estimate that straight sided drilled shafts designed and constructed as recommended will experience total settlements within 0.5 inches.

Straight Sided Drilled Shaft Construction: Straight sided shafts should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each shaft excavation prior to placing concrete to insure that:

1) The drilled shaft has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report.
2) The column is concentric with the drilled shaft.
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

Based on Borings B-4 and B-5, AEC anticipates that the straight sided drilled shafts will be excavated within stiff to hard lean/fat clay (CL/CH) soil. As noted in Table 1 in Section 4.1 of this report, no groundwater was encountered during drilling in Borings B-4 and B-5. AEC anticipates that groundwater seepage into the shaft excavations will be relatively low. However, the groundwater level at the site will fluctuate with seasonal rainfall and other climatic events and may be higher at the time of construction. If groundwater is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. If significant sloughing or caving occurs during shaft excavation, a temporary steel casing and/or bentonite slurry may be necessary to keep the shaft sidewalls intact.

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New drilled shafts, if any, should not be excavated within 3 shaft diameters (edge to edge) of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled shaft to an adjacent unfilled shaft. Placement of concrete should be accomplished immediately after excavation is completed to reduce changes in the state of stress and possible sloughing in the foundation soils. No shafts should be left open overnight or poured without the prior approval of the Owner's Representative.

In addition, each drilled shaft excavation should be inspected by a qualified Owner's Representative prior to placing concrete, to check that (1) the shaft excavation has been constructed to the specified dimensions at the recommended depth and formation and (2) excessive cuttings and any soft-compressible materials have been removed from the bottom of the excavation.

5.3 Storage Building near Running Track

Based on the provided drawings, a proposed storage building will be located on the south side of the existing running track, adjacent to the track/football field bleachers.

Soil and Groundwater Conditions: Based on Boring B-6, the soil conditions at the storage building generally consist of approximately 10 feet of stiff to hard fat/lean clay (CH/CL), followed by 2 feet of firm to stiff silty clay (CL-ML) from a depth of 10 to 12 feet, underlain by very loose to medium dense silty sand (SM/SP-SM) to the boring termination depth of 25 feet below grade. Groundwater was encountered at depths of 10 to 14 feet below existing grade.

5.3.1 Building Foundations

Based on Boring B-6, AEC notes that the top 10 feet of soil at the storage building generally consists of clay soils with PI that ranges from 13 to 36, which indicates a medium to high expansive potential (see Degree of Plasticity of Cohesive Soils on Plate A-10, in Appendix A).

AEC notes that highly expansive clays within the zone of seasonal moisture variation will experience significant amounts of shrink and swell movements as their moisture contents vary throughout the years. In order to mitigate the impact of the expansive clays, AEC recommends that the building foundations be placed below the zone of seasonal moisture variation (which is typically 10 feet below grade in the Greater Houston

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area). AEC therefore recommends the building should be supported on drilled and underreamed footings that are founded at a depth of at least 10 feet below existing grade.

Allowable Bearing Capacity and Footing Depth: Drilled and underreamed footings founded at a depth of approximately 10 feet below existing grade should be designed for an allowable bearing capacity of 1,700 psf for sustained loads and an allowable bearing capacity of 2,550 psf for total loads. The allowable bearing capacities provided include a FS of 3 for sustained loads and a FS of 2 for total loads. Whichever net allowable bearing capacity results in a larger footing diameter should be used for design.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each footing should contain reinforcing steel throughout its full length to sustain an uplift load of at least 50d kips, where "d" is the diameter of the shaft in feet.

Footing Spacing: To reduce stress overlap from adjacent footings and potential construction problems, the minimum edge-to-edge clear spacing between the underreams should not be less than 0.6 x diameter of the larger underream.

Footing Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered and the anticipated structural loads, we estimate that drilled-and-underreamed footings, designed and constructed as recommended in this report, will experience total settlements on the order of 1 inch.

Drilled-and-Underreamed Footing Construction: Drilled-and-underreamed footings should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each footing excavation prior to placing concrete to insure that:

1) The footing has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report;
2) The column is concentric with the pier cap/grade beam and drilled footing; and
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

There is a possibility that slickensides and/or pockets/seams of sands/silts within the clay soils may make underreaming (belling) difficult and result in potential sloughing or caving-in of the shaft excavation

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sidewalls during construction, particularly for underreams over 6 feet in diameter. We recommend that a maximum diameter ratio of bell to shaft not exceed 2 to 1.

Based on Boring B-6, AEC anticipates that the drilled and underreamed footings will be excavated within stiff to hard lean/fat clay (CL/CH) soil. Based on Table 1 in Section 4.1 of this report, groundwater encountered in the boring was at a level just below the proposed footing depths of 10 feet below grade. In addition, the site's groundwater level will fluctuate with seasonal rainfall and other climatic events, and may be higher at the time of construction. If ground water is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. However, if significant sloughing or caving occurs during shaft excavation, further excavation should be stopped and a reduced bell/shaft ratio or even straight-sided shafts (matching the bell diameter) in combination with bentonite slurry and/or temporary casing may be necessary.

Placement of concrete should be accomplished immediately after excavation is completed to reduce potential for sloughing of the foundation soils. Footing excavations should not be left open overnight. No concrete should be placed without the prior approval of FBISD's Representative. New drilled footings should not be excavated within 2 bell diameters or 15 feet (edge to edge), whichever is larger, of an open footing excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled footing to an adjacent unfilled footing.

5.3.2 Building Floor Slabs

AEC assumes that the storage building will have a floor slab that will be at or near existing grade. AEC should be notified if the FFE of the storage building will be more than 6 inches higher than existing grade, so that our recommendations can be adjusted as necessary.

Estimated Soil Movements: General discussion of estimated soil movements and PVR for building floor slabs are presented in Section 5.1.2 of this report. Based on Boring B-6, the existing soil at the storage building is highly expansive.

PVR: For the top 10 feet of the existing soils encountered in Boring B-6, the PVR of the storage building is approximately 2.2 inches based on in-situ moisture conditions.

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Table 3. Estimated PVR vs. Thickness of Replacement Fill for Storage Building

Thickness of Replacement Fill Beneath the Existing Ground Surface (ft)	PVR (in), based on Boring B-6
0	2.2
1	1.8
2	1.5
3	1.1
4	0.6

Floor Slab: AEC understands that the PVR requirement for buildings is typically considered to be 1 inch. In accordance with Table 3, a minimum of 3.5 feet of soil excavation would be required to reduce the PVR of the storage building to 1 inch.

5.3.2.1 Subgrade Supported Floor Slab

In accordance with Table 3 in Section 5.3.2 of this report, approximately 3.5 feet of existing soil would have to be removed and replaced with low-expansive select fill in order to achieve a PVR of 1 inch. This option assumes that uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure are maintained adequately, and that any resultant movements can be adequately sustained by the subgrade soils and foundation system.

It is AEC's experience that the majority of imported "select" fill that is being excavated from borrow pits in the Houston area is poor quality that does not meet AEC's select fill specifications (see Section 5.4.2 of this report). Imported "select fill" material typically has a high sand/silt content combined with large clay boulders/chunks and is not homogenous. This material is permeable, which will allow surface water to infiltrate through it and cause both the clay boulders within the fill to swell, and will also penetrate through the sand/silt and then cause the underlying natural clay soils to swell as well, resulting in significant floor slab movement and cracking.

Based on the expansive soils encountered in Boring B-6, **AEC prefers the use of lime-stabilized clay fill for this project over using imported "select" fill for the soil replacement beneath a subgrade supported floor slab for this site. If FBISD decides to use select clay fill instead of lime-stabilized clay fill, AEC cautions that stringent quality control (QC) over select clay fill material imported to the site should be observed**, both by FBISD's inspectors and the onsite CMT laboratory. Without proper QC, there is a risk

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that substandard select fill will either have a higher than allowed expansive potential or a higher than allowed sand content, both of which will result in potential long term issues for the floor slab performance.

Using the lime stabilized clay soil will be beneficial for the overall performance of the building floor slab because: (i) it will reduce the potential for surface water to enter into the highly expansive natural clay soils beneath the building pad which in turn will reduce the potential for the subgrade clays to shrink and swell; (ii) it will be subject to less vertical and differential settlement as the fill consolidates over time; and (iii) it will provide a competent working surface during construction of the building pad. Lime-stabilized clay recommendations are presented in Section 5.4.1 of this report.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

After surface stripping, an additional 3 feet (i.e. total depth of 3.5 feet, which includes the 6 inches of surface removal) of existing soils should be removed. After the overburden is excavated, the exposed subgrade should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted lime-stabilized soils as necessary. After proof rolling is performed, either compacted lime-stabilized clay fill or compacted select clay fill should then be used to achieve the bottom of the building floor slab. Lime-stabilized clay fill and select clay fill recommendations are presented in Sections 5.4.1 and 5.4.2 of this report, respectively.

According to Table 3 in Section 5.3.2 of this report, the PVR for 3.5 feet of soil replacement will be approximately 1 inch. However, FBISD should be aware that some risk of floor slab movement is still present if this floor slab option is selected. If conditions which exacerbate moisture variations such as the presence of trees, poor drainage, excessive drying/wetting of subsurface soils, or leaking underground utilities are located nearby, the floor slab total vertical movements and net differential vertical movements could be higher than estimated.

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Grade Beams: We recommend that foundation grade beams be founded at least 30 inches below FFE. The grade beams can be constructed on 6 inch carton forms. If carton forms are used (at the discretion of the building designer), care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. If carton forms are used, AEC recommends that Motz blocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. If no carton forms will be used, we recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings and beams should be tied together.

Floor slabs are typically structurally tied to the grade beams. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.4 Fill Requirements

5.4.1 Lime Stabilized Clay Fill

Soils Stabilized with Hydrated Lime: AEC prefers that lime-stabilized clay be used as structural fill. Either: (i) imported lime-stabilized clay soils (stabilized offsite before delivery to the project site); or (ii) clay soils excavated onsite and treated with hydrated lime can be used. Clay soils excavated onsite should first be stabilized with a minimum of 7 percent hydrated lime (by dry soil weight). The amount of hydrated lime provided in this report is for estimation purposes only. The actual amount of lime required for stabilization should be determined by lime-series curve or pH method in a laboratory prior to construction. Lime stabilization should be done in general accordance with Section 02336 of the 2023 COHSCS. AEC prefers using stabilized soil as structural fill since compacted stabilized soil generally has high strength, low compressibility, and relatively low permeability.

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Lifts and Compaction: Lime-stabilized clay fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

Lime-stabilized clay should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

5.4.2 Select Clay Fill

'Select' Fill: It is AEC's experience that 'select' fill material imported from sand and clay pits in the Greater Houston area is generally non-homogenous (i.e. composed of a mixture of sands, silts, and clays, instead of a homogenous sandy clay material) and of poor quality, and either contains too much sand or has large clay clods with high expansive potential. Use of this non-homogenous soil can result in poor long term performance of structures and pavements placed on top of the fill.

Select fill (whether imported from offsite or is already onsite) should consist of ***uniform***, non-active inorganic lean clays with a PI between 10 and 20 percent, and more than 50 percent passing a No. 200 sieve. Material intended for use as select fill shall not have clay clods with PI greater than 20, clay clods greater than 2 inches in diameter, or contain sands/silts with PI less than 10. Sand and clay mixtures/blends are unacceptable for use as select fill. Sand/silt with clay clods is unacceptable for use as select fill. Mixing sand into clay or mixing clay into sand/silt is also unacceptable for use as select fill. **Prior to construction, the Contractor should determine if he or she can obtain qualified select fill meeting the above select fill criteria. The testing lab shall *reject* any material intended for use as select fill that does not meet the PI, sieve, and clay clod requirements above, unless approved otherwise by AEC.**

Lifts and Compaction: All material intended for use as select fill should be tested prior to use to confirm that it meets select fill criteria. The fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

Select fill should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

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Testing: **If select fill will be used, at least one Atterberg Limits and one percent passing a No. 200 sieve test shall be performed for each 10,000 square feet (sf) of placed fill, per lift (with a minimum of one set of tests per lift), to determine whether it meets select fill requirements.** Prior to placement of pavement or concrete, the moisture contents of the top 2 lifts of compacted select fill shall be re-tested (if there is an extended period of time between fill placement and concrete placement) to determine if the in-place moisture content of the lifts have been maintained at the required moisture requirements.

5.4.3 General Clay Fill

General clay fill can be used beneath structural floor slabs or for fill areas that will not support proposed (or future) structures or pavements (i.e. for mass site grading). AEC recommends that general clay fill consist of a clean, cohesive soil (USCS Classification "CL" or "CH"). Granular soils (i.e. sands, silts, and gravel; not more than 50 percent retained on No. 200 sieve) should not be used as general fill.

General clay fill should be placed in loose lifts not exceeding 8 inches in thickness. The fill should be compacted to 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation and Grading

To mitigate site problems that may develop following prolonged periods of rainfall, it is essential to have adequate drainage to maintain a relatively dry and firm surface prior to starting any work at the site. Adequate drainage should be maintained throughout the construction period. Methods for controlling surface runoff and ponding include proper site grading, berm construction around exposed areas, and installation of sump pits with pumps.

6.2 Construction Monitoring

Site preparation (including clearing and proof rolling), foundation and pavement construction, and subgrade preparation should be monitored by qualified geotechnical professionals to check for compliance with project documents and changed conditions, if encountered. AEC should be allowed to review the design and

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construction plans and specifications prior to release to check that the geotechnical recommendations and design criteria presented herein are properly interpreted.

7.0 LIMITATIONS

The information contained in this report summarizes conditions found on the date the borings were drilled. The attached boring logs are true representations of the soils encountered at the specific boring locations on the date of drilling. Reasonable variations from the subsurface information presented in this report should be anticipated. AEC should be notified immediately if conditions encountered during construction are significantly different from those presented in this report.

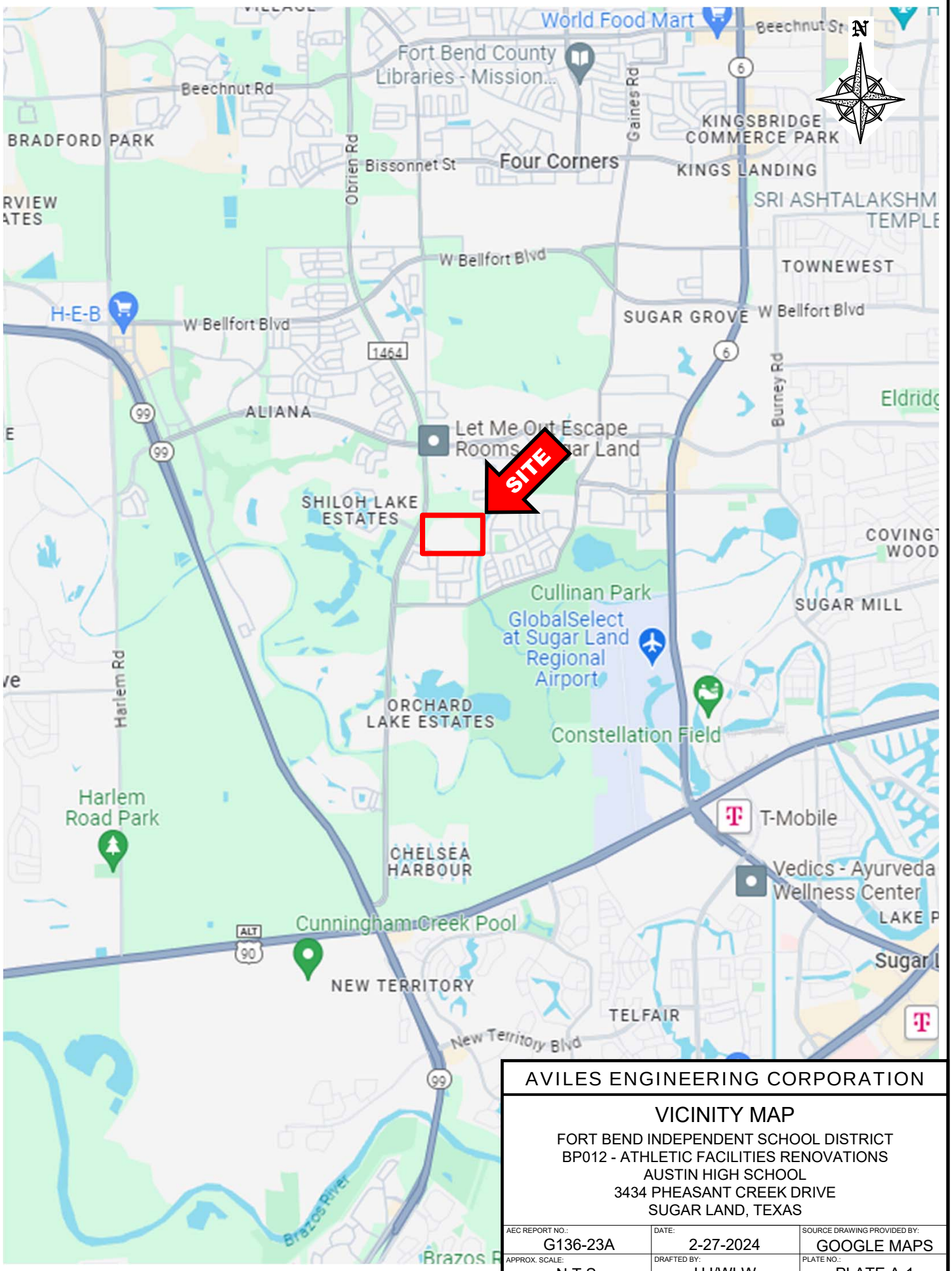
This investigation was performed using the standard level of care and diligence normally practiced by recognized geotechnical engineering firms in this area, presently performing similar services under similar circumstances. This report is intended to be used in its entirety. The report has been prepared exclusively for the project and location described in this report. If pertinent project details change or otherwise differ from those described herein, AEC should be notified immediately and retained to evaluate the effect of the changes on the recommendations presented in this report and revise the recommendations if necessary. The scope of services does not include a fault investigation. The recommendations presented in this report should not be used for other structures located at this site or similar structures located elsewhere, without additional evaluation and/or investigation.

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APPENDIX A

Plate A-1	Vicinity Map
Plate A-2	Boring Location Plan
Plates A-3 to A-8	Boring Logs
Plate A-9	Key to Symbols
Plate A-10	Classification of Soils for Engineering Purposes
Plate A-11	Terms Used on Boring Logs
Plate A-12	ASTM & TXDOT Designation for Soil Laboratory Tests
Plate A-13	Sieve Analysis Results

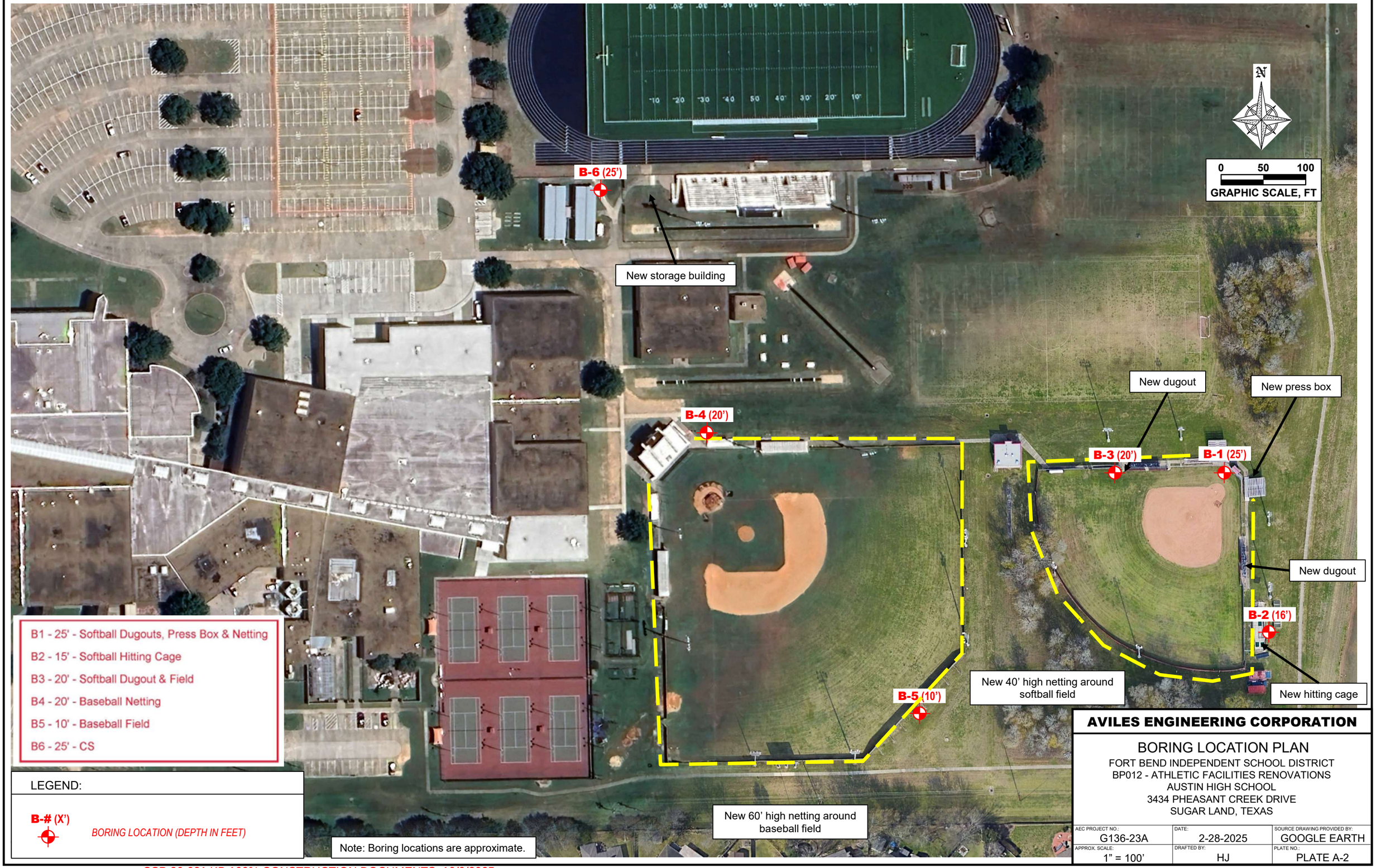


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VICINITY MAP

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
AUSTIN HIGH SCHOOL
3434 PHEASANT CREEK DRIVE
SUGAR LAND, TEXAS

AEC REPORT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G136-23A	2-27-2024	GOOGLE MAPS
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
N.T.S.	HJ/WLW	PLATE A-1



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BORING LOCATION PLAN

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
AUSTIN HIGH SCHOOL
3434 PHEASANT CREEK DRIVE
SUGAR LAND, TEXAS

AEC PROJECT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G136-23A	2-28-2025	GOOGLE EARTH
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
1" = 100'	HJ	PLATE A-2

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PROJECT: Austin High School Athletics Renovations BORING B-1

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Fill: hard, grayish brown Lean Clay (CL), with ferrous nodules		23					
	Stiff to hard, gray Fat Clay with Sand (CH), with slickensides		22		85	72	20	52
5			21	102.0				
	-with calcareous nodules 6'-10'		23					
	-with ferrous nodules 8'-10'		27		85	66	21	45
10	Stiff to very stiff, gray and tan Fat Clay (CH), with slickensides		24	99.7				
	-with calcareous and ferrous nodules 10'-12'							
	-brown and gray 12'-14'		26					
	-boring cave-in at 12' during drilling							
	-goundwater at 12' approximately 15 minutes after intial encounter							
15			31		89	65	19	46
	-light gray and tan, with sand pockets 14'-16'							
	Very loose to medium dense, tan Poorly Graded Sand with Silt (SP-SM), wet	20	17					
20		8	20					
		4	21		7			
25	Termination Depth = 25 feet							
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

BORING DRILLED TO **25** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **15** FEET WHILE DRILLING ▽

WATER LEVEL AT **12** FEET AFTER **COMPLETE** ▽

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23A** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-3**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Austin High School Athletics Renovations BORING B-2

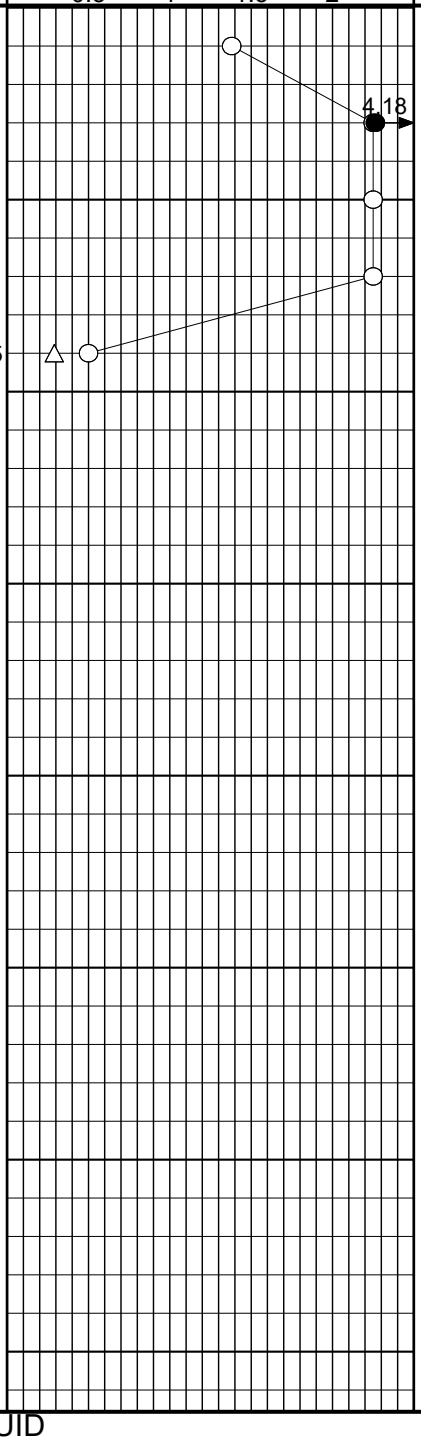
DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Very stiff to hard, gray and brown Sandy Fat Clay (CH), with slickensides		25		70	53	17	36
			-with calcareous nodules 0'-2'		22	101.1				
5			Firm to hard, gray and brown Lean Clay with Sand (CL)		14					
			-with ferrous nodules 4'-6'		12		73	47	14	33
			-tan and gray, with calcareous nodules 6'-8'							
			-boring cave-in at 8' during drilling							
			-groundwater at 8' approximately 15 minutes after initial encounter		19	101.5				
10			Very loose to loose, tan Silty Sand (SM), wet	4	24					
				7	19		25			
15			-tan and light gray, with lean clay pockets 14'-16'	4	20					
			Termination Depth = 16 feet							
20										
25										
30										
35										

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2



BORING DRILLED TO 15 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 10 FEET WHILE DRILLING ▽
WATER LEVEL AT 8 FEET AFTER COMPLETE ▽
DRILLED BY ACE DRAFTED BY EN LOGGED BY EN

PROJECT NO. G136-23A C26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 PLATE A-4

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Austin High School Athletics Renovations BORING B-3

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Soft to hard, gray Sandy Fat Clay (CH), with slickensides -with ferrous nodules 0'-2' -brown and gray 2'-6'		16		52	55	18	37
			27	89.8				
5			29					
	Stiff to very stiff, brown and gray Fat Clay with Sand (CH), with slickensides and calcareous nodules -gray and tan, with ferrous nodules 8'-10'		26		83	78	22	56
			31	91.6				
10	Very stiff, light gray and tan Fat Clay (CH) -with calcareous nodules 10'-12'		24		93	65	20	45
	Loose to medium dense, tan Silty Sand (SM), wet -boring cave-in at 14' during drilling	8	19					
15		11	20					
	-with lean clay pockets 18'-20'	12	20		17			
20	Termination Depth = 20 feet							
25								
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

BORING DRILLED TO **20** FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT **14** FEET WHILE DRILLING
WATER LEVEL AT **14** FEET AFTER **COMPLETE**
DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23A** C3826-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-5**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Austin High School Athletics Renovations BORING B-4

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Very stiff, grayish brown Lean Clay (CL), with ferrous and calcareous nodules		25					
			Very stiff, gray Fat Clay with Sand (CH)		25		82	72	22	50
			-with ferrous stains 2'-4'							
5			-gray and brown 4'-8'		25	99.8				
					26					
			Very stiff, light gray and tan Sandy Fat Clay (CH), with ferrous and calcareous nodules		26		70	59	18	41
10			Stiff to hard, light gray Lean Clay with Sand (CL)		22	106.2				
			-with calcareous nodules 10'-14'							
			-light gray and tan 12'-18'		20					
15					24		82	49	18	31
			-with calcareous nodules 16'-18'		26	95.6				
			Loose, light gray Silty Sand (SM), with lean clay pockets	6	25		37			
20			Termination Depth = 20 feet							
25										
30										
35										

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

BORING DRILLED TO **20** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23A** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-6**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Austin High School Athletics Renovations BORING B-5

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF (△ Confined Compression, ● Unconfined Compression, ○ Pocket Penetrometer, □ Torvane; 0.5, 1, 1.5, 2)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Stiff to very stiff, gray Fat Clay (CH), with slickensides -with calcareous nodules 0'-2' -with ferrous stains 2'-6'		29			93	95	30	65
					25	97.8					
5					28						
			Stiff, light gray and tan Fat Clay with Sand (CH), with calcareous nodules and ferrous stains		24			77	72	21	51
			Stiff, light gray and tan Lean Clay with Sand (CL), with calcareous nodules and ferrous stains		22	104.2					
10			Termination Depth = 10 feet								
15											
20											
25											
30											
35											

BORING DRILLED TO **10** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23A** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-7**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Austin High School Athletics Renovations BORING B-6

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Hard, brown Sandy Fat Clay (CH), with slickensides -with roots 0'-2' -gray and tan 2'-6', with calcareous nodules 2'-4' -with ferrous stains 4'-6'		20 15 15	113.1	65	54	18	36
5			Stiff to hard, gray and dark gray Sandy Lean Clay (CL) -with calcareous pockets and seams 6'-10' -tan and light gray, with ferrous stains 8'-10'		16 21		66	28	15	13
10			Firm to stiff, tan and light gray Sandy Silty Clay (CL-ML), with calcareous nodules -boring cave-in at 10' during drilling		17	113.5				
15			Medium dense, tan Silty Sand (SM) -with lean clay pockets 12'-14' -wet 14'-16'	15 4	21 22		25			
20			Very loose to loose, tan Poorly Graded Sand with Silt (SP-SM), wet -with lean clay pockets 18'-20'	WOH 5	23 21		6			
25			Loose, tan Silty Sand (SM), wet -with lean clay partings 23'-25'	5	21		21			
			Termination Depth = 25 feet							
30										
35										

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

3.2

BORING DRILLED TO 25 FEET WITHOUT DRILLING FLUID
WATER ENCOUNTERED AT 14 FEET WHILE DRILLING ▽
WATER LEVEL AT 10 FEET AFTER 15 MINS ▽
DRILLED BY ACE DRAFTED BY EN LOGGED BY EN

PROJECT NO. G136-23A C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 PLATE A-8

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	Fill
	High plasticity clay
	Poorly graded sand with silt
	Low plasticity clay
	Silty sand
	Silty low plasticity clay
Misc. Symbols	
	Water table depth during drilling
	Subsequent water table depth
○	Pocket Penetrometer
●	Unconfined Compression
△	Confined Compression
Soil Samplers	
■	Undisturbed thin wall Shelby tube
	Standard penetration test

PLATE A-9

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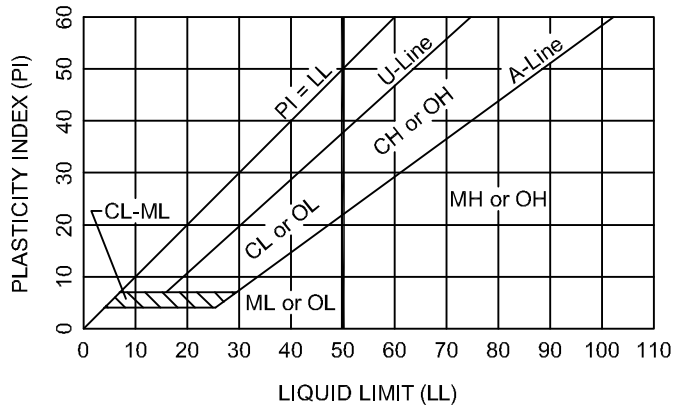
CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation D-2487

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well-graded gravel, well-graded gravel with sand
				GP	Poorly-graded gravel, poorly-graded gravel with sand
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	GM	Silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone on plasticity chart	GC	Clayey gravel, clayey gravel with sand
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well-graded sand, well-graded sand with gravel
				SP	Poorly-graded sand, poorly-graded sand with gravel
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	SM	Silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone on plasticity chart	SC	Clayey sand, clayey sand with gravel
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)		SILTS AND CLAYS (Liquid Limit Less Than 50%)		ML	Silt, silt with sand, silt with gravel, sandy silt, gravelly silt
				CL	Lean clay, lean clay with sand, lean clay with gravel, sandy lean clay, gravelly lean clay
				OL	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt
		SILTS AND CLAYS (Liquid Limit 50% or More)		MH	Elastic silt, elastic silt with sand, sandy elastic silt, gravelly elastic silt
				CH	Fat clay, fat clay with sand, fat clay with gravel, sandy fat clay, gravelly fat clay
				OH	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt

NOTE: Coarse soils between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone of the plasticity chart are to have dual symbols.

PLASTICITY CHART



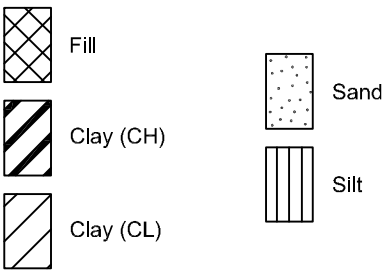
Equation of A-Line: Horizontal at PI=4 to LL=25.5, then PI=0.73(LL-20)

Equation of U-Line: Vertical at LL=16 to PI=7, then PI=0.9(LL-8)

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree of Plasticity	Plasticity Index
None	0 - 4
Slight	5 - 10
Medium	11 - 20
High	21 - 40
Very High	>40

SOIL SYMBOLS



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TERMS USED ON BORING LOGS

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

6"	3"	3/4"	#4	#10	#40	#200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002	

SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength, Kips per Sq. ft.	SPT Blowcount
Very Soft	less than 0.25	< 2 bpf
Soft	0.25 to 0.50	2-4 bpf
Firm	0.50 to 1.00	4-8 bpf
Stiff	1.00 to 2.00	8-16 bpf
Very Stiff	2.00 to 4.00	16-32 bpf
Hard	greater than 4.00	>32 bpf

RELATIVE DENSITY OF COHESIONLESS SOILS FROM STANDARD PENETRATION TEST

Very Loose	≤ 4 bpf
Loose	5-10 bpf
Medium Dense	11-30 bpf
Dense	31-50 bpf
Very Dense	>50 bpf

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows per Foot	Description
25	25 blows driving sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows driving sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows driving sampler 3 inches, during initial 6-inches seating interval.

NOTE: To avoid change to sampling tools, driving is limited to 50 blows during or after seating interval.

DRY STRENGTH ASTM D2488

None	Dry specimen crumbles into powder with mere pressure of handling
Low	Dry specimen crumbles into powder with some finger pressure
Medium	Dry specimen breaks into pieces or crumbles with considerable pressure
High	Dry specimen cannot be broken with finger pressure, it can be broken between thumb and hard surface
Very High	Dry specimen cannot be broken between thumb and hard surface

MOISTURE CONDITION ASTM D2488

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the easiness of breaking along these planes.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Friable	Crumbly, can be easily crushed with light pressure.
Blocky	Clays that have a block-like or polyhedral structure.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil types.
Interlayered	Soil sample composed of alternating layers of different soil types.
Intermixed	Soil sample composed of pockets of different soil types and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of calcium material.

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ASTM & TXDOT DESIGNATION FOR SOIL LABORATORY TESTS

SOIL TEST	ASTM TEST DESIGNATION	TXDOT TEST DESIGNATION
Unified Soil Classification System	D 2487	Tex-142-E
Moisture Content	D 2216	Tex-103-E
Specific Gravity	D 854	Tex-108-E
Sieve Analysis	D 6913	Tex-110-E (Part 1)
Hydrometer Analysis	D 7928	Tex-110-E (Part 2)
Minus No. 200 Sieve	D 1140	Tex-111-E
Liquid Limit	D 4318	Tex-104-E
Plastic Limit	D 4318	Tex-105-E
Standard Proctor Compaction	D 698	Tex-114-E
Modified Proctor Compaction	D 1557	Tex-113-E
California Bearing Ratio	D 1883	-
Swell	D 4546	-
Consolidation	D 2435	-
Unconfined Compression	D 2166	-
Unconsolidated-Undrained Triaxial	D 2850	Tex-118-E
Consolidated-Undrained Triaxial	D 4767	Tex-131-E
Permeability (constant head)	D 5084	-
Pinhole	D 4647	-
Crumb	D 6572	-
Double Hydrometer	D 4221	-
pH of Soil	D 4972	Tex-128-E
Soil Suction	D 5298	-
Soil Sulfate	C 1580	Tex-145-E
Organics	D 2974	Tex-148-E

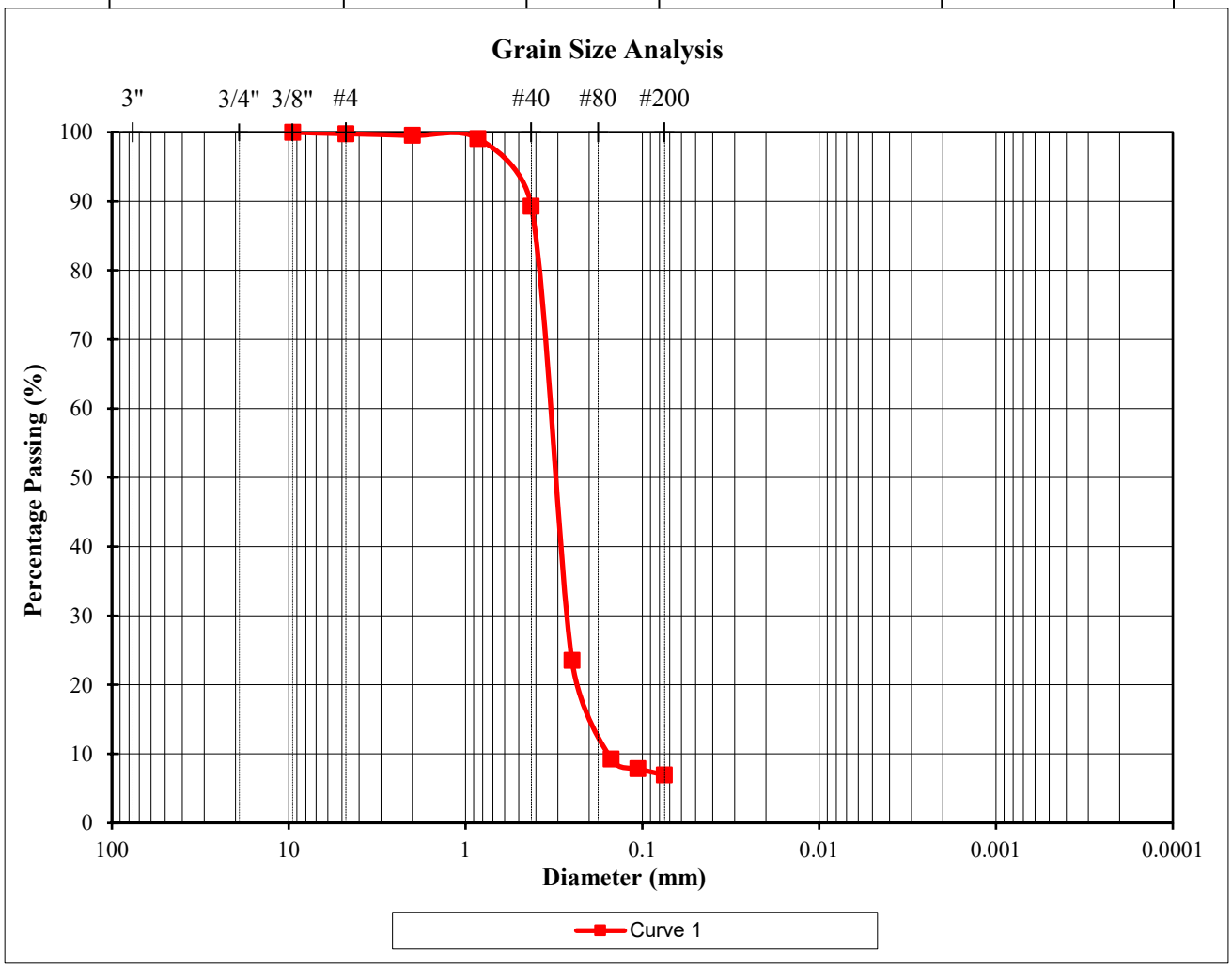
AVILES ENGINEERING CORPORATION

Consulting Engineers - Geotechnical, Construction Materials Testing, Environmental

GRAIN SIZE ANALYSIS - SIEVE (ASTM D 6913)

Project: FBISD Austin High School Athletics Renovations **Job No.:** G136-23A
Location of Project: Fort Bend County, Texas

Gravel	Sand		Silt	Clay
	Coarse to Medium	Fine		



Curve	Boring	Depth (ft)	Soil Description	D50 (mm)	Cu	Cc
1	B-1A	23-25	Poorly Graded Sand with Silt (SP-SM)	0.32	2.23	1.32

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GEOTECHNICAL INVESTIGATION

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
DULLES HIGH SCHOOL
550 DULLES AVENUE
SUGAR LAND, TEXAS

Prepared for:
Fort Bend Independent School District
Sugar Land, Texas

by

Aviles Engineering Corporation
5790 Windfern
Houston, Texas 77041
713-895-7645

REPORT NO. G136-23B (Final)

February 2025

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AVILES
ENGINEERING CORP.

February 28, 2025

Ms. Amanda Janek (Coggins)
Fort Bend Independent School District
16431 Lexington Boulevard
Sugar Land, Texas 77479

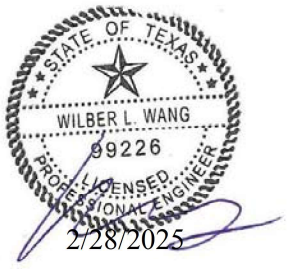
Reference: **Geotechnical Investigation**
Fort Bend Independent School District
BP012 - Athletic Facilities Renovations
Dulles High School
550 Dulles Avenue
Sugar Land, Texas
AEC Report No.: G136-23B (Final)

Dear Ms. Janek,

Aviles Engineering Corporation (AEC) is pleased to present this report of the results of our geotechnical investigation for the above referenced project. The project terms and conditions were performed in accordance with the Master Agreement for Professional Services between Fort Bend Independent School District (FBISD) and AEC, dated August 21, 2023. The project scope of services is in accordance with AEC Proposal No. G2023-10-05R1, dated October 11, 2023.

AEC appreciates the opportunity to be of service to you. Please call us if you have any questions or comments concerning this report or when we can be of further assistance.

Respectfully submitted,
Aviles Engineering Corporation
(TBPELS Firm Registration No. F-42)



2/28/2025

Wilber L. Wang, P.E.
Senior Engineer

Hanie Joodat, Ph.D., P.E.
Project Engineer

Reports Submitted: 1 Fort Bend Independent School District (electronic)
1 File (electronic)

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APPENDIX A

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GEOTECHNICAL INVESTIGATION

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
DULLES HIGH SCHOOL
550 DULLES AVENUE
SUGAR LAND, TEXAS

1.0 INTRODUCTION

1.1 General

The report submitted herein presents the results of Aviles Engineering Corporation's (AEC) geotechnical investigation for the Dulles High School Athletic Facilities Renovations project, located at 550 Dulles Avenue in Sugar Land, Texas (Fort Bend County Key Map No.: 569 N), as part of the Fort Bend Independent School District (FBISD) 2023 Bond Program (FBISD Project No. BP012). A vicinity map of the project location is presented on Plate A-1, in Appendix A. AEC notes that the overall scope of the FBISD 2023 Bond Program (BP012) includes renovations of athletic facilities of three high schools: Austin High School, Dulles High School, and Hightower High School. This report, AEC Report No. G136-23B is for Dulles High School. Recommendations for BP012 - Austin High School are presented in AEC Report No. G136-23A and recommendations for BP012 - Hightower High School are presented in AEC Report No. G136-23C.

Based on preliminary information presented in schematic design drawings (dated November 9, 2023) prepared by Pfluger Architects, there are numerous improvements proposed for the athletics facilities at Dulles High School. However, as indicated on the provided drawings, the improvements that will be covered by this geotechnical report are limited to: (i) reconstruction of the existing baseball field, including new ticket booth, concrete masonry unit (CMU) dugouts, and 60 foot high netting around the field, and synthetic turf; and (ii) reconstruction of the existing softball field, including new ticket booth, 40 foot high netting around the field, and synthetic turf. According to FBISD, the future weight room addition at the existing field house has been deleted from the project.

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1.2 Purpose and Scope

The purpose of this geotechnical investigation is to evaluate the subsurface soil and groundwater conditions at the project site and develop geotechnical engineering recommendations for the proposed improvements. The scope of this geotechnical investigation is summarized below:

1. Drilling and sampling six geotechnical borings ranging from 10 to 25 feet below existing grade.
2. Engineering analyses and recommendations for foundation types, bearing depth, allowable bearing capacity, floor slab, and subgrade preparation for the baseball field dugouts and ticket booth and softball field ticket booth.
3. Engineering analyses and recommendations for foundation types and lateral resistance for softball field and baseball field netting poles.
4. Engineering analyses and recommendations for softball field and baseball field synthetic turf.
5. Construction recommendations for the proposed improvements.

2.0 SUBSURFACE EXPLORATION

2.1 Soil Borings

Boring locations and depths at the project site and depths were indicated on the schematic drawings prepared by Pluger Architects. Boring locations were staked in the field by AEC personnel using a handheld GPS unit. AEC drilled a total of six borings at the project site to depths ranging from 10 to 25 feet below existing grade. The approximate boring locations are shown on the Boring Location Plan on Plate A-2, in Appendix A. The total drilling footage is 115 feet. The boring locations were not surveyed after completion of drilling.

2.2 Drilling and Sampling Methods

Borings B-1 through B-6 were drilled using a truck-mounted drilling rig and were advanced using dry auger method. Undisturbed samples of cohesive soils and some disturbed samples of granular soils were obtained from the borings by pushing 3-inch diameter thin-wall, seamless steel Shelby tube samplers in general accordance with ASTM D 1587. Granular soils were sampled with a 2-inch split-barrel sampler in accordance with ASTM D 1586. Standard Penetration Test resistance (N) values for these samples were recorded as "Blows per Foot" and are shown on the boring logs. Strength of the cohesive soils was estimated in the field using a hand penetrometer. The undisturbed samples of cohesive soils were extruded mechanically from the tube samplers in the field and wrapped in aluminum foil; all soil samples were sealed in plastic bags to reduce

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moisture loss and disturbance. The samples were then placed in core boxes and transported to the AEC laboratory for testing and further study. Groundwater readings were obtained during drilling and after completion of drilling. The boreholes were backfilled with bentonite chips upon completion of drilling.

3.0 LABORATORY TESTING PROGRAM

Soil laboratory testing was performed by AEC personnel. Samples from the borings were examined and classified in the laboratory by a technician under the supervision of a geotechnical engineer. Laboratory tests were performed on selected soil samples to evaluate the engineering properties of the foundation soils in accordance with applicable ASTM Standards. Atterberg limits, moisture contents, percent passing a No. 200 sieve, and dry unit weight tests were performed on selected samples to establish the index properties and confirm field classification of the subsurface soils. Strength properties of cohesive soils were determined by means of unconfined compression (UC) and unconsolidated-undrained (UU) triaxial tests performed on undisturbed samples. The laboratory test results are presented on the representative boring logs (see Plates A-3 through A-8, in Appendix A). A key to the boring logs, classification of soils for engineering purposes, terms used on boring logs, and reference ASTM Standards for laboratory testing are presented on Plates A-9 through A-12, in Appendix A.

4.0 SITE CONDITIONS

4.1 Subsurface Conditions

Details of the soils encountered during drilling are presented in the boring logs on Plates A-3 through A-8, in Appendix A. Soil strata encountered in the borings are summarized below.

Boring	Depth (ft)	Description of Stratum
B-1	0 - 22	Firm to hard, Fat Clay (CH), with slickensides
	22 - 25	Lean Clay (CL)
B-2	0 - 10	Stiff to hard, Fat Clay (CH), with slickensides
B-3	0 - 10	Stiff to hard, Fat Clay (CH), with slickensides
B-4	0 - 2	Very stiff, Sandy Fat Clay (CH), with sand seams
	2 - 14	Stiff to hard, Fat Clay (CH), with slickensides
	14 - 16	Hard, Lean Clay (CL), with ferrous and calcareous nodules, and silt pockets

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Boring	Depth (ft)	Description of Stratum
B-4 (cont.)	16 - 20	Stiff to very stiff, Fat Clay (CH), with slickensides and calcareous nodules
B-5	0 - 2	Fill: very stiff, Lean Clay (CL), with sand pockets
	2 - 14	Stiff to hard, Fat Clay (CH), with slickensides
	14 - 16	Very stiff, Sandy Lean Clay (CL)
	16 - 18	Clayey Sand (SC)
	18 - 22	Medium dense, Silty Sand (SM)
	22 - 25	Loose, Poorly Graded Sand with Silt (SP-SM), with lean clay pockets
B-6	0 - 2	Very stiff, Fat Clay with Sand (CH), with silty clay seams, roots, and silty sand pockets
	2 - 18	Firm to hard, Fat Clay (CH), with slickensides
	18 - 22	Very stiff, Sandy Lean Clay (CL), with silty clayey sand seams and calcareous nodules
	22 - 25	Silty Sand (SM), with lean clay pockets

Subsurface Soil Properties: The subsurface clayey soils (including fill but excluding clayey sand) encountered in the borings have medium to very high plasticity (see "Degree of Plasticity of Cohesive Soils" on Plate A-10, in Appendix A), with liquid limits (LL) ranging from 32 to 95, and plasticity indices (PI) ranging from 18 to 67. The cohesive soils encountered are classified as "CL" and "CH" type soils, and granular soils encountered are classified as "SC", "SM" and "SP-SM" type soils in accordance with ASTM D 2487. "CH" soils undergo significant volume changes due to seasonal changes in soil moisture contents. "CL" type soils with lower LL (less than 40) and PI (less than 20) generally do not undergo significant volume changes with changes in moisture content. However, "CL" soils with LL approaching 50 and PI greater than 20 essentially behave as "CH" soils and could undergo significant volume changes. Slickensides were encountered in most fat clay (CH) soils.

Groundwater Conditions: Groundwater levels encountered in the borings and the boring cave-in depths encountered in the borings during drilling are summarized in Table 1.

Table 1. Water Levels in Borings

Boring No.	Date Drilled	Boring Depth (ft)	Boring Groundwater Depth (ft)	Boring Cave-in Depth (ft)
B-1	11/21/2023	25	Dry (Drilling) Dry (Complete)	Boring did not cave in
B-2	11/21/2023	10	Dry (Drilling) Dry (Complete)	Boring did not cave in
B-3	11/22/2023	10	Dry (Drilling) Dry (Complete)	Boring did not cave in

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Boring No.	Date Drilled	Boring Depth (ft)	Boring Groundwater Depth (ft)	Boring Cave-in Depth (ft)
B-4	11/22/2023	20	Dry (Drilling) Dry (Complete)	Boring did not cave in
B-5	11/22/2023	25	18 (Drilling) 17 (15 Mins.) 17 (Complete)	17 (Drilling)
B-6	11/22/2023	25	Dry (Drilling) Dry (Complete)	Boring did not cave in

The information in this report summarizes conditions found on the dates the borings were drilled. However, it should be noted that our groundwater observations are short-term; groundwater depths and subsurface soil moisture contents will vary with environmental variations such as frequency and magnitude of rainfall and the time of year when construction is in progress.

4.2 Hazardous Materials

No signs of visual staining or odors were encountered during field drilling or during processing of the soil samples in the laboratory. However, AEC notes that the presence of potential hazardous material at other locations within the project area cannot be discounted based upon the very small and limited number of samples taken.

4.3 Subsurface Variations

It should be emphasized that: (i) at any given time, groundwater depths can vary from location to location, and (ii) at any given location, groundwater depths can change with time. Groundwater depths will vary with seasonal rainfall and other climatic/environmental events. Subsurface conditions may vary away from and in between the boring locations.

Clay soils in the Greater Houston area typically have secondary features such as slickensides, calcareous and ferrous nodules, and contain sand/silt seams/lenses/layers/pockets. It should be noted that the information in the boring logs is based on 3-inch diameter soil samples. In Borings B-1, B-5, and B-6, soil samples were obtained continuously at intervals of 2 feet in the top 20 feet of the borings, then at 5 feet intervals thereafter to the boring termination depth of 25 feet below grade. In Borings B-2 through B-4, soil samples were obtained continuously at intervals of 2 feet from the ground surface to the boring termination depths of 10 to

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20 feet below grade. A detailed description of the soil secondary features may not have been obtained due to the small sample size and sampling interval between the samples. Therefore, while a boring log shows some soil secondary features, it should not be assumed that the features are absent where not indicated on the boring logs.

5.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

Based on preliminary information presented in schematic design drawings (dated November 9, 2023) prepared by Pfluger Architects, there are numerous improvements proposed for the athletics facilities at Dulles High School. However, as indicated on the provided drawings, the improvements that will be covered by this geotechnical report are limited to: (i) reconstruction of the existing baseball field, including new ticket booth, CMU dugouts, and 60 foot high netting around the field, and synthetic turf; and (ii) reconstruction of the existing softball field, including new ticket booth, 40 foot high netting around the field, and synthetic turf.

AEC notes that detailed drawings of the proposed Dulles High School athletics improvements were not available at the time this report was prepared. AEC should be notified once drawings become available so that the recommendations presented in this report can be updated as necessary.

Construction Specifications: AEC is not aware if there are specific construction specifications for FBISD projects. For this report, AEC has instead referred to City of Houston Standard Construction Specifications (COHSCS). AEC should be notified if different construction specifications should be used.

5.1 Buildings

AEC understands that the proposed buildings for this project include two new CMU dugouts and a ticket booth at the baseball field and a new ticket building at the softball field. Based on the schematic drawings, AEC assumes that the dugouts will be above existing grade.

Boring B-5: As noted in Section 2.0 of this report, the boring locations were selected based on the schematic drawings prepared by Pfluger Architects and provided to AEC by FBISD in October 2023. However, AEC notes that schematic drawings prepared by Pfluger that are dated November 2023 show the softball field proposed ticket booth in a location that is closer to Boring B-4 instead of Boring B-5. For this report, AEC assumes that the ticket booth location is indeed adjacent to Boring B-4. AEC should be notified once updated

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site plan drawings become available so that the recommendations in this report can be updated as necessary.

Soil and Groundwater Conditions: Based on Borings B-1 and B-4, the soil conditions at the various buildings generally consist of firm to hard fat/lean clay (CH/CL) to a depth of at least 20 feet below existing. Groundwater was not encountered in the borings.

5.1.1 Building Foundations

Based on Borings B-1 and B-4, AEC notes that the top 10 feet of soil at the various buildings generally consist of clay soils with a PI ranging from 35 to 67, which indicates a high to very high expansive potential (see Degree of Plasticity of Cohesive Soils on Plate A-10, in Appendix A).

AEC notes that highly expansive clays within the zone of seasonal moisture variation will experience significant amounts of shrink and swell movements as their moisture contents vary throughout the years. In order to mitigate the impact of the expansive clays, AEC recommends that the building foundations be placed below the zone of seasonal moisture variation (which is typically 10 feet below grade in the Greater Houston area). AEC therefore recommends the buildings should be supported on drilled and underreamed footings that are founded at a depth of at least 10 feet below existing grade.

Allowable Bearing Capacity and Footing Depth: Recommended bearing depth and net allowable bearing capacity for drilled and underreamed footings for the various buildings is presented on Table 2.

Table 2. Drilled and Underreamed Footing Bearing Depth and Net Allowable Bearing Capacities

Buildings	Nearest Boring	Bearing Depth below Existing Grade (ft)	Net Allowable Bearing Capacity, Sustained Load (FS=3), psf	Net Allowable Bearing Capacity, Total Load (FS=2), psf
Baseball Field Dugouts and Ticket Booth	B-1	10	2,800	4,200
Softball Field Ticket Booth	B-4	10	2.600	3,900

The allowable bearing capacities provided in Table 2 include a factor of safety (FS) of 3 for sustained loads and a FS of 2 for total loads. Whichever net allowable bearing capacity results in a larger footing diameter should be used for design.

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Uplift Capacity: The drilled-and-underreamed foundations supporting the baseball field dugouts may be subject to uplift wind loads. According to O'Neill and Reese (1999), "Drilled Shafts: Construction Procedures and Design Methods", the uplift resistance of a drilled-and-underreamed footing in cohesive soils can be calculated as:

$$Q\ (uplift) = (s_u\ N_u\ A_u)/FS_1 + W_c/FS_2 + W_s/FS_3 \quad \text{.....Equation (1)}$$

$$N_u = 1.5\ D_b / B_b \ \leq 9 \quad \text{.....Equation (2)}$$

where:
- Q = Allowable uplift resistance of a drilled footing (lbs).
- s_u = Average undrained shear strength of the cohesive soil between the base of the bell and 2 B_b above the base; use s_u = 1,000 psf, based on Boring B-1 (for dugouts only).
- N_u = Bearing capacity factor for base uplift resistance, $N_u \leq 9$.
- D_b = Depth of base below ground surface minus the seasonal moisture change zone for a drilled and underreamed footing (ft). The seasonal moisture change zone in the Greater Houston area can be considered as 10 feet below the existing ground surface.
- B_b = Diameter of the bell (ft).
- B_s = Diameter of the shaft (ft).
- W_c = Effective weight of concrete footing (lbs).
- W_s = Effective weight of projected soil above the bell, lbs (use unit weight, γ = 120 pcf for soils above water table, and buoyant unit weight γ' = 60 pcf for soils below water table).
- A_u = $\pi/4\ (B_b^2 - B_s^2)$, projected area of bell over shaft (ft^2).
- FS_1, FS_2, FS_3 = Factors of Safety for uplift resistance.

We recommend that the following safety factors be used for uplift design: safety factor of 2.0 for soil cohesion (FS_1 = 2), safety factor of 1.1 for dead weight of footing (FS_2 = 1.1), and safety factor of 1.5 for weight of soil above the bell (FS_3= 1.5). Based on above equations, the uplift resistance of a drilled-and-underreamed footing can be increased by extending the founding depth of the footing or increasing the diameter of the bell.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each footing should contain reinforcing steel throughout its full length to sustain an uplift load of at least 52d kips, where "d" is the diameter of the shaft in feet.

Footing Spacing: To reduce stress overlap from adjacent footings and potential construction problems, the minimum edge-to-edge clear spacing between the underreams should not be less than 0.6 x diameter of the larger underream.

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Footing Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered and the anticipated structural loads, we estimate that drilled-and-underreamed footings, designed and constructed as recommended in this report, will experience total settlements on the order of 1 inch.

Drilled-and-Underreamed Footing Construction: Drilled-and-underreamed footings should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each footing excavation prior to placing concrete to insure that:

1) The footing has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report;
2) The column is concentric with the pier cap/grade beam and drilled footing; and
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

There is a possibility that slickensides and/or pockets/seams of sands/silts within the clay soils may make underreaming (belling) difficult and result in potential sloughing or caving-in of the shaft excavation sidewalls during construction, particularly for underreams over 6 feet in diameter. We recommend that a maximum diameter ratio of bell to shaft not exceed 2 to 1.

Based on Borings B-1 and B-4, AEC anticipates that the drilled and underreamed footings will be excavated within firm to hard fat clay (CH) soils. Based on Table 1 in Section 4.1 of this report, no groundwater was encountered during drilling in Borings B-1 and B-4. However,, the site's groundwater level will fluctuate with seasonal rainfall and other climatic events, and may be higher at the time of construction. If ground water is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. However, if significant sloughing or caving occurs during shaft excavation, further excavation should be stopped and a reduced bell/shaft ratio or even straight-sided shafts (matching the bell diameter) in combination with bentonite slurry and/or temporary casing may be necessary.

Placement of concrete should be accomplished immediately after excavation is completed to reduce potential for sloughing of the foundation soils. Footing excavations should not be left open overnight. No concrete should be placed without the prior approval of FBISD's Representative. New drilled footings should not be

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excavated within 2 bell diameters or 15 feet (edge to edge), whichever is larger, of an open footing excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh concrete from the recently filled footing to an adjacent unfilled footing.

5.1.2 Building Floor Slabs

AEC assumes that the ticket booths and dugouts will have a floor slab that will be at or near existing grade. AEC should be notified if the finished floor elevations (FFE) of buildings will be more than 6 inches higher than existing grade, so that our recommendations can be adjusted as necessary.

Estimated Soil Movements: Potential Vertical Rise (PVR) is an estimate of the potential of an expansive soil to swell from its current state. PVR was computed using TxDOT test method Tex-124-E. Based on Borings B-1 and B-4, the existing soil at the proposed building locations is highly expansive. Expansive clays exhibit a potential to shrink and swell with changes in their moisture contents. The changes in the soil moisture content are usually caused by variations in the seasonal amount of rainfall and evaporation rates or other localized factors like the moisture withdrawal by nearby trees. The seasonal moisture active zone generally extends to about 10 feet below ground in the Greater Houston area, and will be deeper if trees with deep root zones exist adjacent to the structures.

Additional movements can occur in areas if water is allowed to pond during or after construction on soils with high plasticity, or if highly plastic soils are allowed to dry out prior to fill or concrete placement. High plasticity clay may also experience shrinkage during periods of dry weather as moisture evaporation occurs at the ground surface and the groundwater table drops. The actual PVR of the site will be highly dependent upon the actual PI and moisture regime of the clayey soils at the time of construction. Therefore, uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure is critical to reducing potential shrink-swell movement of the floor slab.

PVR: The estimated PVR for the various buildings is presented on Table 3. AEC notes that the estimated PVR assumes that the FFE of the various buildings will be at or near existing grade, and does not include the impact of additional surcharge loading due to the placement of fill needed to raise the site grade.

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Table 3. Estimated PVR vs. Thickness of Replacement Fill for Buildings

Thickness of Replacement Fill Beneath the Existing Ground Surface (ft)	PVR (in) for Baseball Field Ticket Booth and Dugouts, based on Boring B-1	PVR (in) for Softball Field Ticket Booth, based on Boring B-4
0	4.8	4.8
1	4.3	4.6
2	3.7	4.5
3	3.2	3.6
4	2.7	2.8
5	2.2	2.2
6	1.7	1.5
7	1.3	1.2
8	0.9	0.8

Floor Slab: AEC understands that the PVR requirement for buildings is typically considered to be 1 inch. In accordance with Table 3, a minimum of 8 feet of soil excavation would be required to reduce the PVR of the baseball field and softball field buildings to 1 inch.

For the various buildings, AEC recommends the following floor slab options be considered: (i) Option 1 - a structural floor slab supported on drilled and underreamed footings with a 10 inch void space between the bottom of the slab and the top of the subgrade soils; (ii) Option 2 - a subgrade supported floor slab, with 5 feet excavation and replacement of existing soils beneath the slab; or (iii) Option 3 - a subgrade supported floor slab, with treatment of the underlying soils by injecting an ionic soil stabilizer (ISS) to a depth of 10 feet.

5.1.2.1 Option 1 - Structural Floor Slab

The most effective method to mitigate movement of subgrade soils due to shrink-swell cycles of expansive soils is construction of a drilled-footing supported structural floor slab with 6 to 10 inch carton forms between the bottom of the slab and the top of the subgrade soil. AEC recommends that 10 inch carton forms be used for the baseball field and softball field buildings.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After

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demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

The exposed subgrade should then be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with clean onsite clay soils. Afterwards, general fill can be placed and compacted to achieve the elevation at the bottom of the carton forms. General fill recommendations are presented in Section 5.4.3 of this report.

Grade Beams: We recommend that foundation grade beams be founded at least 24 inches below FFE. The grade beams should be constructed on 10 inch carton forms. Care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. AEC recommends that Motz blocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. The drilled-and-underreamed footings and beams should be tied together.

Moisture Barrier: To prevent mildew or mold growth on the underside of the structural floor slab, we recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab (on top of the carton forms).

5.1.2.2 Option 2 - Subgrade Supported Floor Slab

In accordance with Table 3 in Section 5.1.2 of this report, approximately 8 feet of existing soil would have to be removed and replaced with low-expansive select fill in order to achieve a PVR of 1 inch for the baseball field and softball field borings, which is most likely cost-prohibitive and impractical. In addition, thick layers of compact fill will also experience vertical and differential settlement of the fill over time.

Instead of excavating 8 feet of existing soil for the baseball field and softball field buildings, a concrete slab-on-grade in conjunction with *limited* fill replacement can be considered as an alternative to full-depth replacement, if FBISD is willing to take some risk of floor slab movement. For the baseball field and softball field buildings, AEC recommends a limited excavation depth of 5 feet be used. This option assumes that

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uniformity and preservation of the moisture contents of the near surface clays during construction and during the life of the structure are maintained adequately, and that any resultant movements can be adequately sustained by the subgrade soils and foundation system.

It is AEC's experience that the majority of imported "select" fill that is being excavated from borrow pits in the Houston area is poor quality that does not meet AEC's select fill specifications (see Section 5.4.2 of this report). Imported "select fill" material typically has a high sand/silt content combined with large clay boulders/chunks and is not homogenous. This material is permeable, which will allow surface water to infiltrate through it and cause both the clay boulders within the fill to swell, and will also penetrate through the sand/silt and then cause the underlying natural clay soils to swell as well, resulting in significant floor slab movement and cracking.

Based on the expansive soils encountered in Borings B-1 and B-4, **AEC prefers the use of lime-stabilized clay fill for this project over using imported "select" fill for the soil replacement beneath a subgrade supported floor slab for this site. If FBISD decides to use select clay fill instead of lime-stabilized clay fill, AEC cautions that stringent quality control (QC) over select clay fill material imported to the site should be observed**, both by FBISD's inspectors and the onsite Construction Materials Testing (CMT) laboratory. Without proper QC, there is a risk that substandard select fill will either have a higher than allowed expansive potential or a higher than allowed sand content, both of which will result in potentially unwanted long term issues (such as slab distortion, movement, and/or cracking) for the floor slab.

Using the lime stabilized clay fill will be beneficial for the overall performance of the building floor slab because: (i) it will reduce the potential for surface water to enter into the highly expansive natural clay soils beneath the building pad which in turn will reduce the potential for the subgrade clays to shrink and swell; (ii) it will be subject to less vertical and differential settlement as the fill consolidates over time; and (iii) it will provide a competent working surface during construction of the building pad. Lime-stabilized clay fill recommendations are presented in Section 5.4.1 of this report.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The excavation depth should be increased when inspection indicates the presence of organics or deleterious materials to greater depths.

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After surface stripping, an additional 4.5 feet (i.e. total depth of 5 feet, which includes the 6 inches of surface removal) of existing soils should be removed for the baseball field and softball field buildings. After the overburden is excavated, the exposed subgrade should be proof-rolled in accordance with Item 216 of the 2014 TxDOT Standard Specifications to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted lime-stabilized soils as necessary. After proof rolling is performed, either compacted lime-stabilized clay fill or compacted select clay fill should then be used to achieve the bottom of the building floor slab. Lime-stabilized clay fill and select clay fill recommendations are presented in Sections 5.4.1 and 5.4.2 of this report, respectively.

According to Table 3 in Section 5.1.2 of this report, the PVR for 5 feet of soil replacement for the baseball field and softball field buildings will still be 2.2 inches. FBISD should be aware that some risk of floor slab movement is still present if this floor slab option is selected. If conditions which exacerbate moisture variations such as the presence of trees, poor drainage, excessive drying/wetting of subsurface soils, or leaking underground utilities are located nearby, the floor slab total vertical movements and net differential vertical movements could be higher than estimated.

Grade Beams: We recommend that foundation grade beams be founded at least 30 inches below FFE. The grade beams can be constructed on 10 inch carton forms. If carton forms are used (at the discretion of the building designer), care should be taken so that the carton forms do not collapse during concrete placement and will not be exposed to water in the grade beam excavations. Surface water should not be allowed to seep into and remain in the carton form space during the life of the structures. If carton forms are used, AEC recommends that Motz blocks (or equivalent system) be used to prevent soil from filling the void beneath the grade beam after the carton forms have decayed. If no carton forms will be used, we recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings and beams should be tied together.

Floor slabs are typically structurally tied to the grade beams. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements and the floor slabs are expected to move corresponding to the subgrade soils.

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Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.1.2.3 Option 3 - Inject Ionic Soil Stabilizer

Option 3 also includes a subgrade supported floor slab; however, in order to limit the PVR impact on the floor slab, the existing expansive clay soils within the building footprint can be injected with an ISS to a minimum depth of 10 feet (without requiring over-excavation of existing soil, as presented in Option 2 in Section 5.1.2.2 of this report). Injection of a liquid ISS, such as Earthlok Soil Stabilizer (or equivalent product), should be able to reduce the potential of the expansive clay soils from experiencing shrink and swell movements and therefore prevent the building floor slab from experiencing distress in the future due to movement of expansive soils. However, although research has been conducted to determine the effectiveness of ionic clay soil stabilization, this treatment method has not yet achieved widespread acceptance and no national standard (by the federal government or professional civil engineering body) is currently available. **The effectiveness of injecting liquid ISS in an effort to reduce the expansive potential of clay soils cannot be guaranteed by AEC**, especially in regard to: (i) the ability of the ISS to render the clay effectively inert; and (ii) for the ISS to adequately penetrate/permeate vertically and horizontally throughout the clay mass. **If the ISS injection treatment method is used, AEC will accept no liability regarding its effectiveness to reduce/prevent shrink and swell movements of expansive clay soils, or on the long-term performance of the building floor slabs (and any floor slab distress that could potentially occur)**.

AEC notes that an injection depth of 10 feet should be able to cover existing expansive clay soils within the moisture active zone; if treatment is effective, then the anticipated PVR of the floor slab should be on the order of 1 inch, or less. AEC suggests that the grid spacing of the injection points be close enough to ensure that the expansive clay soils within the treatment area be adequately treated; some degree of overlap between treated soil columns is recommended. However, the ultimate determination of treatment area, injection spacing, treatment depth, as well as means and methods for liquid ISS injection shall be by the ISS Contractor.

Subgrade Preparation: Subgrade preparation should extend a minimum of 5 feet beyond the floor slab perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. The exposed subgrade should then be proof-rolled, in accordance

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with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other unsuitable materials; such materials should be replaced with compacted general fill. After proof-rolling, the ISS can be injected to a minimum depth of 10 feet below grade; the center to center spacing of the ISS injections should be determined by the ISS provider.

Testing: AEC understands that Earthlok requires that geotechnical soil testing be performed after soil stabilization is completed for warranty purposes. AEC recommends that soil borings be performed to a depth of 10 feet within the ISS treated areas. Recommended laboratory tests include, but are not necessarily limited to moisture contents, Atterberg Limits, and swell tests. Frequency of borings and laboratory testing can be determined once the ISS treatment is completed. The additional borings and testing can be performed by either AEC or a different CMT laboratory, although AEC must be allowed to review the test results if the testing is performed by a different CMT laboratory.

Grade Beams: We recommend that foundation grade beams be founded at least 30 inches below FFE. We recommend that tensile reinforcement be placed in both top and bottom of the beams. The drilled footings and beams should be tied together.

Floor slabs are frequently structurally tied to the grade beams, although this will be at the building designer's discretion. Alternatively, isolating the floor slabs from grade beams with a flexible impervious compound will be beneficial to reduce the potential for slab cracking due to differential soil movement; however, its use will not mitigate the total and differential PVR movements, and the floor slabs are expected to move corresponding to the subgrade soils.

Moisture Barrier: We recommend that a horizontal moisture barrier (minimum 10-mil thick) be placed below the concrete slab to move edge effects away from the slab and mitigate seasonal fluctuations of water content directly below the structure.

5.2 Baseball and Softball Field Netting

Based on the provided schematic drawings, 60 foot high netting will be used around the baseball field while 40 foot high netting will be used around the softball field. Based on information provided by FBISD, the netting pole configuration will consist of a 12 foot high CMU block wall at grade with the poles extending

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through the CMU block wall.

AEC should be notified once drawings become available so that our recommendations can be updated as necessary.

5.2.1 Netting Pole Foundations

Based on the soil conditions encountered in Borings B-1 through B-4, AEC recommends that the netting poles and CMU block walls around the baseball field and softball field be supported on straight sided drilled shafts. AEC anticipates that shaft lengths may be between 10 and 15 feet deep; however, the shaft length shall be determined be the pole designer. AEC anticipates that straight shaft design for the netting poles and CMU block walls will be predominantly based on lateral resistance to wind and other lateral loads. However, AEC recommends that the straight sided drilled shafts extend a minimum of 10 feet deep, regardless of the length necessary to resist lateral loads (see below).

Allowable Bearing Capacity: Based on the soil conditions encountered in Borings B-1 through B-4, end bearing straight sided drilled shafts founded at a minimum depth of 10 to 15 feet below existing grade should be designed for a net allowable bearing capacity of 2,000 psf for sustained loads and 3,000 psf for total loads. Whichever net allowable bearing capacity results in a more conservative shaft diameter should be used for design. The allowable bearing capacities provided include a FS of 3.0 for sustained loads and a FS of 2.0 for total loads.

Vertical Reinforcement: To withstand uplift forces resulting from the shrink/swell movements of clay soils in the moisture active zone, each shaft should contain reinforcing steel throughout its full length to sustain an uplift load of at least 52d kips, where "d" is the diameter of the shaft in feet.

Lateral Capacity: The minimum required shaft embedment depth (for lateral load support), under non-constrained condition (free-head condition) and with maximum lateral deflection of 0.5 inch at the shaft head, can be calculated based on the following equations [2018 International Building Code (IBC), Section 1807.3.2.1]:

$$D_{min} = 0.5A[1 + (1+4.36h/A)^{½}] \quad \text{.....Equation (3)}$$

$$A = 2.34V/(S_1B) \quad \text{.....Equation (4)}$$

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where, D_{min} = minimum required depth of shaft embedment (ft).
V = applied lateral shear load (wind load) (lbs).
h = vertical distance from ground surface to point of application of V (ft).
B = diameter of drilled shaft (ft).
S_1 = allowable lateral soil pressure at z, $S_1 = 100*z$ (per 2018 IBC Table 1806.2), lb/ft^2; an increase of one-third (i.e., $S_1 = 133*z$) is permitted when considering load combinations, including wind or earthquake loads, as permitted by 2018 IBC Section 1806.2.
z = $D_{min}/3$, depth below the ground surface (use a maximum value of 12 feet for z) (ft).

AEC should be notified if LPile soil parameters are required instead for drilled shaft lateral resistance design.

Drilled Shaft Settlements: A detailed settlement analysis is beyond the scope of this investigation. Based on the soil conditions encountered, we estimate that straight sided drilled shafts designed and constructed as recommended will experience total settlements within 0.5 inches.

Straight Sided Drilled Shaft Construction: Straight sided shafts should be constructed in accordance with Section 02465 of the 2023 COHSCS. A qualified geotechnical technician should check each shaft excavation prior to placing concrete to insure that:

1) The drilled shaft has been constructed to the specified dimensions at the recommended depth and founded in the correct formation as indicated in this report.
2) The column is concentric with the drilled shaft.
3) Excessive cuttings, any soft or compressible materials, and ponded water are removed from the bottom of the excavation.

Based on Borings B-1 through B-4, AEC anticipates that the 10 to 15 feet long straight sided drilled shafts will be excavated within firm to hard fat/lean clay (CH/CL) soil. As noted in Table 1 in Section 4.1 of this report, groundwater was not encountered in Borings B-1 through B-4 during drilling. However, the groundwater level at the site will fluctuate with seasonal rainfall and other climatic events and may be higher at the time of construction. If groundwater is encountered within the cohesive soils during construction, sump pumps may be used to pump water out from the excavations and soft sediments should be removed. If significant sloughing or caving occurs during shaft excavation, a temporary steel casing and/or bentonite slurry may be necessary to keep the shaft sidewalls intact.

New drilled shafts, if any, should not be excavated within 3 shaft diameters (edge to edge) of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hours, to prevent movement of fresh

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concrete from the recently filled shaft to an adjacent unfilled shaft. Placement of concrete should be accomplished immediately after excavation is completed to reduce changes in the state of stress and possible sloughing in the foundation soils. No shafts should be left open overnight or poured without the prior approval of the Owner's Representative.

In addition, each drilled shaft excavation should be inspected by a qualified Owner's Representative prior to placing concrete, to check that (1) the shaft excavation has been constructed to the specified dimensions at the recommended depth and formation and (2) excessive cuttings and any soft-compressible materials have been removed from the bottom of the excavation.

5.3 Softball and Baseball Synthetic Turf

AEC notes that the existing softball and baseball fields are currently uneven with poor drainage and will collect ponding water after rainfall events. Based on AEC's discussions with Texas Sports and Civil Engineering (TS&CE), the field improvements will be to re-grade the existing softball and baseball fields to direct surface rainfall into French drains. According to TS&CE, the turf section will consist of (from top to bottom): the synthetic turf, approximately 6 inches of drainage gravel, an impervious geo-synthetic membrane, and then 6 inches of lime stabilized subgrade.

Based on Borings B-1 through B-4, AEC notes that the soils at the ground surface in the vicinity of the softball and baseball fields consists of highly expansive clays, that are particularly susceptible to moisture variation. It is AEC's opinion that these clay soils contribute significantly to the unevenness and poor drainage conditions at the existing fields. AEC recommends that the top 6 inches of surficial soils be stabilized with hydrated lime. Lime treatment of the surficial soils will help reduce the potential for future unevenness of the synthetic turf due to shrink and swell movements of the underlying expansive soils.

Subgrade Preparation: Subgrade preparation should extend a minimum of 2 feet beyond the synthetic turf perimeter. Existing base, pavement, or other structures should first be demolished and removed. After demolition, minimum of 6 inches of surface soils, existing vegetation, trees, roots, and other deleterious materials shall be removed and wasted. After surface stripping, additional soil shall be excavated to reach the bottom of the proposed gravel drainage layer. After excavation, the exposed subgrade should then be proof-rolled, in accordance with Item 216 of the 2014 TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges to identify and remove any weak, compressible, or other

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unsuitable materials; such materials should be replaced with compacted general fill.

After proof rolling, scarify the exposed subgrade to a depth of 6 inches and stabilize with a minimum of 7 percent lime (by dry soil weight). The top of the stabilized subgrade should be sloped to facilitate drainage and prevent ponding of water on top of the stabilized layer. The lime application rate provided should be used for estimating purposes only; the required lime stabilization rate should be determined by the CMT lab (optimum lime content by pH method, ASTM D 6276, is sufficient) during construction. Lime stabilization shall be performed in accordance with Section 02336 of the 2023 COHSCS. After application of lime, the stabilized subgrade should be compacted to at least 95 percent of their ASTM D 698 (Standard Proctor) dry density at a moisture content ranging from optimum to 3 percent above optimum. Once the lime-stabilization is complete, the geo-synthetic membrane, drainage gravel layer, and synthetic turf can be placed.

AEC recommends that the geo-synthetic membrane be a minimum of 30 mil thick, and should be placed directly on top of the lime-stabilized subgrade layer to prevent the migration of fines into the overlying gravel layer. The gravel drainage layer should be placed in minimum 8 inch thick loose lifts, and each lift should be compacted with a minimum of 2 passes of a vibrating roller. The performance of the gravel drainage layer will depend on the permeability, gradation, stability, and compaction of the gravel. The higher the permeability, the more water can be transmitted per unit time. A more open graded gravel will have a higher permeability. The gravel should also be stable and resistant to wear and degradation. Gravel that degrades will result in a decreased permeability. Additionally, over-compaction (i.e., excess passes during installation) of the gravel can result in reduced permeability. The permeability, grading, and durability requirements should be established by the turf designer.

5.4 Fill Requirements

5.4.1 Lime Stabilized Clay Fill

Soils Stabilized with Hydrated Lime: AEC prefers that lime-stabilized clay be used as structural fill. Either: (i) imported lime-stabilized clay soils (stabilized offsite before delivery to the project site); or (ii) clay soils excavated onsite and treated with hydrated lime can be used. Clay soils excavated onsite should first be stabilized with a minimum of 7 percent hydrated lime (by dry soil weight). The amount of hydrated lime provided in this report is for estimation purposes only. The actual amount of lime required for stabilization should be determined by lime-series curve or pH method in a laboratory prior to construction. Lime

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stabilization should be done in general accordance with Section 02336 of the 2023 COHSCS. AEC prefers using stabilized soil as structural fill since compacted stabilized soil generally has high strength, low compressibility, and relatively low permeability.

Lifts and Compaction: Lime-stabilized clay fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

Lime-stabilized clay should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

5.4.2 Select Clay Fill

'Select' Fill: It is AEC's experience that 'select' fill material imported from sand and clay pits in the Greater Houston area is generally non-homogenous (i.e. composed of a mixture of sands, silts, and clays, instead of a homogenous sandy clay material) and of poor quality, and either contains too much sand or has large clay clods with high expansive potential. Use of this non-homogenous soil can result in poor long term performance of structures and pavements placed on top of the fill.

Select fill (whether imported from offsite or is already onsite) should consist of ***uniform***, non-active inorganic lean clays with a PI between 10 and 20 percent, and more than 50 percent passing a No. 200 sieve. Material intended for use as select fill shall not have clay clods with PI greater than 20, clay clods greater than 2 inches in diameter, or contain sands/silts with PI less than 10. Sand and clay mixtures/blends are unacceptable for use as select fill. Sand/silt with clay clods is unacceptable for use as select fill. Mixing sand into clay or mixing clay into sand/silt is also unacceptable for use as select fill. **Prior to construction, the Contractor should determine if he or she can obtain qualified select fill meeting the above select fill criteria. The testing lab shall *reject* any material intended for use as select fill that does not meet the PI, sieve, and clay clod requirements above, unless approved otherwise by AEC.**

Lifts and Compaction: All material intended for use as select fill should be tested prior to use to confirm that it meets select fill criteria. The fill should be placed in loose lifts not exceeding 8 inches in thickness. Backfill within 3 feet of walls or columns should be placed in loose lifts no more than 4-inches thick and compacted using hand tampers, or small self-propelled compactors.

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Select fill should be compacted to a minimum of 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

Testing: **If select fill will be used, at least one Atterberg Limits and one percent passing a No. 200 sieve test shall be performed for each 10,000 square feet (sf) of placed fill, per lift (with a minimum of one set of tests per lift), to determine whether it meets select fill requirements.** Prior to placement of pavement or concrete, the moisture contents of the top 2 lifts of compacted select fill shall be re-tested (if there is an extended period of time between fill placement and concrete placement) to determine if the in-place moisture content of the lifts have been maintained at the required moisture requirements.

5.4.3 General Clay Fill

General clay fill can be used beneath structural floor slabs or for fill areas that will not support proposed (or future) structures or pavements (i.e. for mass site grading). AEC recommends that general clay fill consist of a clean, cohesive soil (USCS Classification "CL" or "CH"). Granular soils (i.e. sands, silts, and gravel; not more than 50 percent retained on No. 200 sieve) should not be used as general fill.

General clay fill should be placed in loose lifts not exceeding 8 inches in thickness. The fill should be compacted to 95 percent of the ASTM D 698 (Standard Proctor) maximum dry unit weight at a moisture content ranging between optimum and 3 percent above optimum.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation and Grading

To mitigate site problems that may develop following prolonged periods of rainfall, it is essential to have adequate drainage to maintain a relatively dry and firm surface prior to starting any work at the site. Adequate drainage should be maintained throughout the construction period. Methods for controlling surface runoff and ponding include proper site grading, berm construction around exposed areas, and installation of sump pits with pumps.

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6.2 Construction Monitoring

Site preparation (including clearing and proof rolling), foundation and pavement construction, and subgrade preparation should be monitored by qualified geotechnical professionals to check for compliance with project documents and changed conditions, if encountered. AEC should be allowed to review the design and construction plans and specifications prior to release to check that the geotechnical recommendations and design criteria presented herein are properly interpreted.

7.0 LIMITATIONS

The information contained in this report summarizes conditions found on the dates the borings were drilled. The attached boring logs are true representations of the soils encountered at the specific boring locations on the dates of drilling. Reasonable variations from the subsurface information presented in this report should be anticipated. AEC should be notified immediately if conditions encountered during construction are significantly different from those presented in this report.

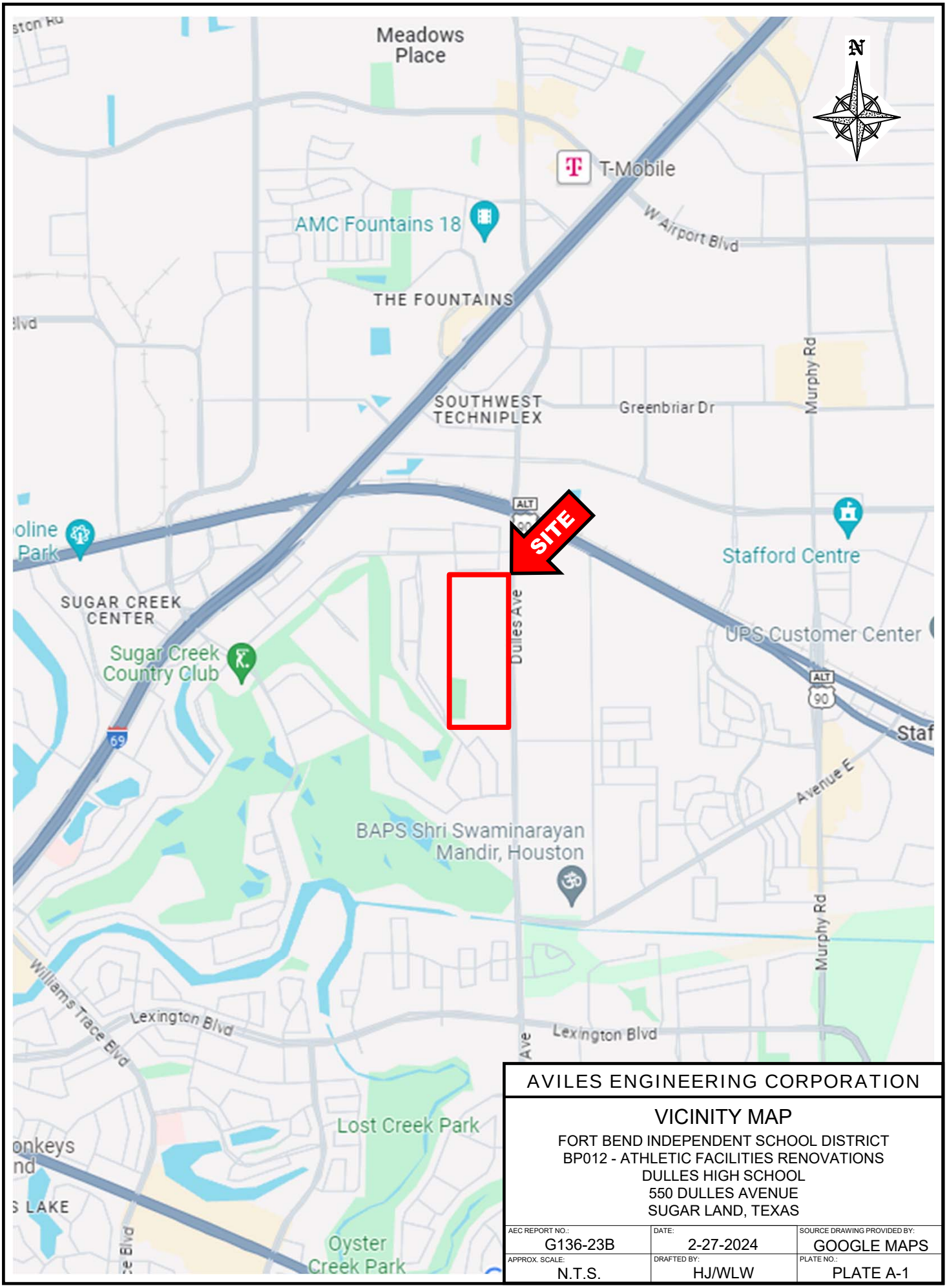
This investigation was performed using the standard level of care and diligence normally practiced by recognized geotechnical engineering firms in this area, presently performing similar services under similar circumstances. This report is intended to be used in its entirety. The report has been prepared exclusively for the project and location described in this report. If pertinent project details change or otherwise differ from those described herein, AEC should be notified immediately and retained to evaluate the effect of the changes on the recommendations presented in this report and revise the recommendations if necessary. The scope of services does not include a fault investigation. The recommendations presented in this report should not be used for other structures located at this site or similar structures located elsewhere, without additional evaluation and/or investigation.

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APPENDIX A

Plate A-1	Vicinity Map
Plate A-2	Boring Location Plan
Plates A-3 to A-8	Boring Logs
Plate A-9	Key to Symbols
Plate A-10	Classification of Soils for Engineering Purposes
Plate A-11	Terms Used on Boring Logs
Plate A-12	ASTM & TXDOT Designation for Soil Laboratory Tests



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VICINITY MAP

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
DULLES HIGH SCHOOL
550 DULLES AVENUE
SUGAR LAND, TEXAS

AEC REPORT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G136-23B	2-27-2024	GOOGLE MAPS
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
N.T.S.	HJ/WLW	PLATE A-1

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B1 - 25' - Baseball Dugouts, Netting & Ticket Booth
B2 - 10' - Baseball Field
B3 - 10' - Softball Field
B4 - 20' - Softball Netting
B5 - 25' - Ticket Booth
B6 - 25' - Field House Future Expansion

LEGEND:

B-# (X’) *BORING LOCATION (DEPTH IN FEET)*

Note: Boring locations are approximate.

AVILES ENGINEERING CORPORATION

BORING LOCATION PLAN

FORT BEND INDEPENDENT SCHOOL DISTRICT
BP012 - ATHLETIC FACILITIES RENOVATIONS
DULLES HIGH SCHOOL
550 DULLES AVENUE
SUGAR LAND, TEXAS

AEC PROJECT NO.:	DATE:	SOURCE DRAWING PROVIDED BY:
G136-23B	2-28-2025	GOOGLE EARTH
APPROX. SCALE:	DRAFTED BY:	PLATE NO.:
1” = 150’	HJ/WLW	PLATE A-2

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-1

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF (△ Confined Compression, ● Unconfined Compression, ○ Pocket Penetrometer, □ Torvane; 0.5, 1, 1.5, 2)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Firm to hard, gray and reddish brown Fat Clay (CH), with slickensides		33			96			
			-with calcareous nodules 0'-2'								
			-gray and tan, with ferrous stains 2'-4'		43	80.9					
5			-gray 4'-6'		38			94	95	28	67
			-with calcareous nodules 6'-18'		37						
					27	96.5					
10			-reddish brown 10'-12', with ferrous nodules 10'-14'		22			97	56	22	34
			-reddish brown and light gray 12'-18'		24						
15					25	102.3					
			-with ferrous nodules 16'-18'		25			93	53	20	33
			-reddish brown 18'-20'		24						
20											
			Reddish brown Lean Clay (CL)		24						
25			Termination Depth = 25 feet								
30											
35											

BORING DRILLED TO **25** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▼

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-3**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-2

DATE 11/21/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF (△ Confined Compression, ● Unconfined Compression, ○ Pocket Penetrometer, □ Torvane; 0.5, 1, 1.5, 2)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Stiff to hard, dark gray Fat Clay (CH), with slickensides		29			94	73	25	48
			-with ferrous stains 0'-6'		34						
5			-dark gray and light gray 4'-6'		36	87.6					
			-reddish brown 6'-10'		28			99	73	25	48
			-with ferrous stains and calcareous nodules 8'-10'		25						
10			Termination Depth = 10 feet								
15											
20											
25											
30											
35											

BORING DRILLED TO **10** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▼

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-4**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-3

DATE 11/22/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	SHEAR STRENGTH, TSF (△ Confined Compression, ● Unconfined Compression, ○ Pocket Penetrometer, □ Torvane; 0.5, 1, 1.5, 2)	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Stiff to hard, dark gray Fat Clay (CH), with slickensides		26			95	88	28	60
			-with ferrous nodules 0'-2'		28	96.3					
5			-with ferrous stains 4'-6'		29			97	86	28	58
			-reddish brown and gray 6'-8', with calcareous nodules 6'-10'		29						
			-reddish brown 8'-10'		25	96.8					
10			Termination Depth = 10 feet								
15											
20											
25											
30											
35											

BORING DRILLED TO **10** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▽

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C3B 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-5**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-4

DATE 11/22/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Very stiff, grayish brown Sandy Fat Clay (CH), with sand seams		31		69	53	18	35
			Stiff to hard, gray Fat Clay (CH), with slickensides -with ferrous nodules 2'-8'		28					
5					30	89.4	96	87	25	62
					33					
			-reddish brown and gray 8'-10', with calcareous nodules 8'-12'		30					
10			-reddish brown 10'-14'		28	95.7	99	71	25	46
					30					
15			Hard, reddish brown Lean Clay (CL), with ferrous and calcareous nodules, and silt pockets		23					
			Stiff to very stiff, reddish brown Fat Clay (CH), with slickensides and calcarous nodules		27	97.5				
					24		97	66	20	46
20			Termination Depth = 20 feet							
25										
30										
35										

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

BORING DRILLED TO **20** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE**

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C23-26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-6**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-5

DATE 11/22/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	SYMBOL	SAMPLE INTERVAL	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0			Fill: very stiff, gray Lean Clay (CL), with organic material at top and sand pockets		15					
			Stiff to hard, dark gray Fat Clay (CH), with slickensides		25	91.2				
5					23		95	82	23	59
			-gray and reddish brown 6'-8', with calcareous nodules 6'-14'		30					
			-reddish brown 8'-14'		27	92.8				
10					24		93	59	20	39
					23					
15			Very stiff, reddish brown Sandy Lean Clay (CL)		12	116.3				
			Reddish brown Clayey Sand (SC) -boring cave-in at 17' during drilling -groundwater at 17' approximately 15 minutes after initial encounter		18		45	28	14	14
20			Medium dense, tan Silty Sand (SM), wet	14	19					
			Loose, tan Poorly Graded Sand with Silt (SP-SM), with lean clay pockets, wet							
25				7	25		8			
			Termination Depth = 25 feet							
30										
35										

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

4.13

BORING DRILLED TO **25** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **18** FEET WHILE DRILLING ▽

WATER LEVEL AT **17** FEET AFTER **COMPLETE** ▽

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C23-26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-7**

AVLES ENGINEERING CORP. GEOTECHNICAL ENGINEERS

PROJECT: Dulles High School Athletics Renovations BORING B-6

DATE 11/22/23 TYPE 4" Dry Auger LOCATION See Boring Location Plan

DEPTH IN FEET	DESCRIPTION	S.P.T. BLOWS / FT.	MOISTURE CONTENT, %	DRY DENSITY, PCF	-200 MESH	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0	Very stiff, gray and reddish brown Fat Clay with Sand (CH), with silty clay seams, roots, and silty sand pockets		28		75	56	20	36
	Firm to hard, dark gray Fat Clay (CH), with slickensides		35					
5	-light gray 4'-6', with ferrous stains 4'-12' and calcareous nodules 4'-18'		38	82.6	94	74	25	49
	-reddish brown and gray 6'-8'		36					
	-reddish brown 8'-12', with silty clay pockets 8'-10'		23					
10			18	110.5				
	-red and gray, with silty sand pockets 12'-14'		21		98	59	21	38
	-red, with ferrous stains 14'-16'		26					
15	-reddish brown and light gray, with lean clay pockets 16'-18'		26	94.0				
	Very stiff, reddish brown Sandy Lean Clay (CL), with silty clayey sand seams and calcareous nodules		20		55	32	14	18
20	Tan Silty Sand (SM), with lean clay pockets		20		28			
25	Termination Depth = 25 feet							
30								
35								

SHEAR STRENGTH, TSF

△ Confined Compression
● Unconfined Compression
○ Pocket Penetrometer
□ Torvane

0.5 1 1.5 2

BORING DRILLED TO **25** FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT **N/A** FEET WHILE DRILLING ▽

WATER LEVEL AT **N/A** FEET AFTER **COMPLETE** ▼

DRILLED BY **ACE** DRAFTED BY **EN** LOGGED BY **EN**

PROJECT NO. **G136-23B** C23-26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025 **PLATE A-8**

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	High plasticity clay
	Low plasticity clay
	Fill
	Clayey sand
	Silty sand
	Poorly graded sand with silt
Misc. Symbols	
○	Pocket Penetrometer
●	Unconfined Compression
△	Confined Compression
▽	Water table depth during drilling
▼	Subsequent water table depth
Soil Samplers	
■	Undisturbed thin wall Shelby tube
☒	Standard penetration test

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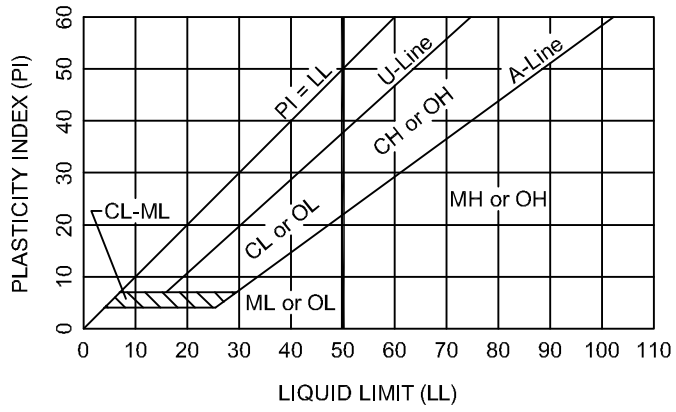
CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM Designation D-2487

MAJOR DIVISIONS				GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (Less than 50% passes No. 200 sieve)	GRAVELS (Less than 50% of coarse fraction passes No. 4 sieve)	CLEAN GRAVELS (Less than 5% passes No. 200 sieve)		GW	Well-graded gravel, well-graded gravel with sand
				GP	Poorly-graded gravel, poorly-graded gravel with sand
		GRAVELS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	GM	Silty gravel, silty gravel with sand
			Limits plot above "A" line & hatched zone on plasticity chart	GC	Clayey gravel, clayey gravel with sand
	SANDS (50% or more of coarse fraction passes No. 4 sieve)	CLEAN SANDS (Less than 5% passes No. 200 sieve)		SW	Well-graded sand, well-graded sand with gravel
				SP	Poorly-graded sand, poorly-graded sand with gravel
		SANDS WITH FINES (More than 12% passes No. 200 sieve)	Limits plot below "A" line & hatched zone on plasticity chart	SM	Silty sand, silty sand with gravel
			Limits plot above "A" line & hatched zone on plasticity chart	SC	Clayey sand, clayey sand with gravel
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)		SILTS AND CLAYS (Liquid Limit Less Than 50%)		ML	Silt, silt with sand, silt with gravel, sandy silt, gravelly silt
				CL	Lean clay, lean clay with sand, lean clay with gravel, sandy lean clay, gravelly lean clay
				OL	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt
		SILTS AND CLAYS (Liquid Limit 50% or More)		MH	Elastic silt, elastic silt with sand, sandy elastic silt, gravelly elastic silt
				CH	Fat clay, fat clay with sand, fat clay with gravel, sandy fat clay, gravelly fat clay
				OH	Organic clay, organic clay with sand, sandy organic clay, organic silt, sandy organic silt

NOTE: Coarse soils between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone of the plasticity chart are to have dual symbols.

PLASTICITY CHART



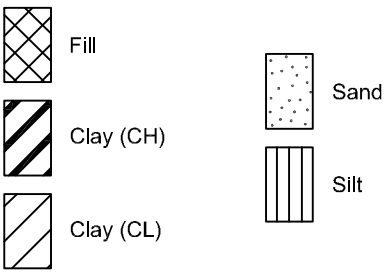
Equation of A-Line: Horizontal at PI=4 to LL=25.5, then PI=0.73(LL-20)

Equation of U-Line: Vertical at LL=16 to PI=7, then PI=0.9(LL-8)

DEGREE OF PLASTICITY OF COHESIVE SOILS

Degree of Plasticity	Plasticity Index
None	0 - 4
Slight	5 - 10
Medium	11 - 20
High	21 - 40
Very High	>40

SOIL SYMBOLS



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TERMS USED ON BORING LOGS

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

6"	3"	3/4"	#4	#10	#40	#200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
152	76.2	19.1	4.76	2.00	0.420	0.074	0.002	

SOIL GRAIN SIZE IN MILLIMETERS

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength, Kips per Sq. ft.	SPT Blowcount
Very Soft	less than 0.25	< 2 bpf
Soft	0.25 to 0.50	2-4 bpf
Firm	0.50 to 1.00	4-8 bpf
Stiff	1.00 to 2.00	8-16 bpf
Very Stiff	2.00 to 4.00	16-32 bpf
Hard	greater than 4.00	>32 bpf

RELATIVE DENSITY OF COHESIONLESS SOILS FROM STANDARD PENETRATION TEST

Very Loose	≤ 4 bpf
Loose	5-10 bpf
Medium Dense	11-30 bpf
Dense	31-50 bpf
Very Dense	>50 bpf

SPLIT-BARREL SAMPLER DRIVING RECORD

Blows per Foot	Description
25	25 blows driving sampler 12 inches, after initial 6 inches of seating.
50/7"	50 blows driving sampler 7 inches, after initial 6 inches of seating.
Ref/3"	50 blows driving sampler 3 inches, during initial 6-inches seating interval.

NOTE: To avoid change to sampling tools, driving is limited to 50 blows during or after seating interval.

DRY STRENGTH ASTM D2488

None	Dry specimen crumbles into powder with mere pressure of handling
Low	Dry specimen crumbles into powder with some finger pressure
Medium	Dry specimen breaks into pieces or crumbles with considerable pressure
High	Dry specimen cannot be broken with finger pressure, it can be broken between thumb and hard surface
Very High	Dry specimen cannot be broken between thumb and hard surface

MOISTURE CONDITION ASTM D2488

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water

SOIL STRUCTURE

Slickensided	Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the easiness of breaking along these planes.
Fissured	Containing shrinkage or relief cracks, often filled with fine sand or silt; usually more or less vertical.
Friable	Crumbly, can be easily crushed with light pressure.
Blocky	Clays that have a block-like or polyhedral structure.
Pocket	Inclusion of material of different texture that is smaller than the diameter of the sample.
Parting	Inclusion less than 1/8 inch thick extending through the sample.
Seam	Inclusion 1/8 inch to 3 inches thick extending through the sample.
Layer	Inclusion greater than 3 inches thick extending through the sample.
Laminated	Soil sample composed of alternating partings or seams of different soil types.
Interlayered	Soil sample composed of alternating layers of different soil types.
Intermixed	Soil sample composed of pockets of different soil types and layered or laminated structure is not evident.
Calcareous	Having appreciable quantities of calcium material.

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ASTM & TXDOT DESIGNATION FOR SOIL LABORATORY TESTS

SOIL TEST	ASTM TEST DESIGNATION	TXDOT TEST DESIGNATION
Unified Soil Classification System	D 2487	Tex-142-E
Moisture Content	D 2216	Tex-103-E
Specific Gravity	D 854	Tex-108-E
Sieve Analysis	D 6913	Tex-110-E (Part 1)
Hydrometer Analysis	D 7928	Tex-110-E (Part 2)
Minus No. 200 Sieve	D 1140	Tex-111-E
Liquid Limit	D 4318	Tex-104-E
Plastic Limit	D 4318	Tex-105-E
Standard Proctor Compaction	D 698	Tex-114-E
Modified Proctor Compaction	D 1557	Tex-113-E
California Bearing Ratio	D 1883	-
Swell	D 4546	-
Consolidation	D 2435	-
Unconfined Compression	D 2166	-
Unconsolidated-Undrained Triaxial	D 2850	Tex-118-E
Consolidated-Undrained Triaxial	D 4767	Tex-131-E
Permeability (constant head)	D 5084	-
Pinhole	D 4647	-
Crumb	D 6572	-
Double Hydrometer	D 4221	-
pH of Soil	D 4972	Tex-128-E
Soil Suction	D 5298	-
Soil Sulfate	C 1580	Tex-145-E
Organics	D 2974	Tex-148-E

GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Elkins High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

February 09, 2024

REPORT NO. HG1810383.17 –E

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

HVJ ASSOCIATES

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February 9, 2024

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Elkins High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17-E

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646



02/09/2024

P. Dahal

Prakash Dahal, PE
Project Engineer

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on February 9, 2024. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Elkins HS. The improvements at Elkins HS involves construction of a new concession stand at softball and baseball fields and a press box and hitting cage at/near the softball field. They also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at the softball and baseball fields. The replacement of the synthetic track surface is also planned. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the concession stand, press box and hitting cage was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 25 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 6 miles southwest of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was not encountered the existing grade in any of the borings during the drilling operations. All the borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7

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feet of soil at the concession stand, press box and hitting cage locations are presented in the table below.

Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Baseball Concession Stand	B-4	1.23	0.73	1.23
Softball Concession Stand & Press Box	B-1	2.08	1.71	2.08
Hitting Cage	B-5	2.94	2.45	2.89

We anticipate that the baseball and softball concession stands, press box and hitting cage are planned to be supported by a shallow foundation system consisting of slab-on-grade.

For baseball concession stand location the PVR is less than 1 inch for the average condition but not for the existing-dry condition. At this location, we recommend using the onsite soil. In order to use the existing soils, the top 3 feet of soil after excavation should be moisture conditioned and compacted. The other way to reduce PVR to less than 1 inch at this location is placing the slab-on-grade on a 2-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 2 feet of on-site soils with select compacted fill.

However, for softball concession stand, press box and hitting cage structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot-thick pad prepared with properly compacted and moisture conditioned structural fill. The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields and synthetic track surface are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

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2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Elkins HS. The improvements at Elkins HS involves construction of a new concession stand at the softball and baseball fields, and a press box and hitting cage at/near the softball field. They also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. The replacement of synthetic track surface is also planned. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 25 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed on November 7th, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling one (1) boring to a depth of 25 feet for softball press box, concession stand and net pole, one (1) boring to a depth of 20 feet for baseball net poles, one (1) boring to a depth of 15 feet for softball hitting cage and two (2) borings to a depth of 10 feet for softball and baseball fields. The borings B-1, B-2, B-3 and B-4 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings except for boring B-1, where the sampling was performed continuously to 20 feet and at 5 feet interval until the termination depth of 25 feet. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°32'39.30"N	95°33'38.40"W	64.0
B-2	29°32'40.50"N	95°33'35.10"W	64.0
B-3	29°32'58.80"N	95°33'28.20"W	63.0
B-4	29°32'54.80"N	95°33'31.40"W	64.0
B-5	29°32'41.10"N	95°33'39.40"W	63.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

Attempts were made to measure the groundwater during the drilling operations. Groundwater readings observed in the borings are discussed in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification

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testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	28
Atterberg Limits (ASTM D4318)	16
Percent Passing No. 200 Sieve (ASTM D1140)	15
Unconfined Compression (ASTM D2166)	8
Unconsolidated-Undrained (ASTM D2850)	4

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

The project site is located in the Alluvium (map symbol Qal) formation in the vicinity of the Beaumont formation. The Alluvial deposits are heterogeneous in nature containing interbedded layers of clay, silt and sand. The depositional features include point-bar, natural levee, stream channel, backswamp, coastal marsh, mud-flat and narrow beach deposits. A geologic map is presented on Plate 3.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately

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6 miles southwest of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Attempts were made to measure the groundwater during the drilling operations. However, groundwater was not encountered below the existing grade in any of the borings. All the borings were dry until the termination depth.

It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

6 FOUNDATION RECOMMENDATIONS FOR CONCESSION STAND, PRESS BOX AND HITTING CAGE

6.1 General

The project involves the construction of a new concession stand at softball and baseball field, press box and hitting cage at/near softball field at Elkins High School. Information related to the proposed foundation system to support these structures was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the slab-on-grade foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

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Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the concession stand, press box and hitting cage locations are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Baseball Concession Stand	B-4	1.23	0.73	1.23
Softball Concession Stand & Press Box	B-1	2.08	1.71	2.08
Hitting Cage	B-5	2.94	2.45	2.89

6.3 Slab-on-grade Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

The concession stand, press box and hitting cage structures may be supported on a slab-on-grade foundation system provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab.

For the baseball concession stand location the PVR is less than 1 inch for average condition but not for existing-dry condition. At this location, we recommend using the onsite soil. Compaction and moisture conditioning for using existing soils should be in accordance with Section 8 of this report. The other way to reduce PVR to less than 1 inch at this location is placing the slab-on-grade on a 2-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 2 feet of on-site soils with select compacted fill.

However, for the softball concession stand, press box and hitting cage structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 5 feet of on-site soils with select compacted fill. We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical professionals to identify any soft or

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weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended for softball concession stand, press box and hitting cage structures. And for baseball concession stand a reaction modulus value of 150 pounds per cubic inch can be used.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS AND SYNTHETIC TRACK SURFACE

7.1 General

We understand that the proposed improvements at Elkins High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field to support the netting. Also, this involves replacement of synthetic turf at softball and baseball fields. In addition, this includes replacement of synthetic track surface at Elkins School.

7.2 Softball and Baseball Netting Poles

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to resist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation. For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.20. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 100 pcf for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 6 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

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Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-3 & B-4	7-8	Stiff Clay	2,000
Softball Pole	B-1 & B-2	6-8	Stiff Clay	2,000

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 6 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Details of the replacement are not available at the time of writing this report. We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.5 for the subgrade preparation recommendations.

7.4 Synthetic Track Surface

The project includes replacement of synthetic track surface at Elkins School. Details of the replacement are not available at the time of writing this report. If the planned replacement includes replacing the asphalt beneath the current track surface we recommend that at least 8 inches of the subgrade be stabilized with 6% lime. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term performance by reducing the tendency of the soil to displace by pumping. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.5 for the subgrade preparation recommendations.

For soil-lime stabilization, scarify the upper 8 inches of exposed surface as required, mix with lime as described previously and compact it to 95 percent of standard Proctor maximum dry density (ASTM D 698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. It should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications.

7.5 Preparation of Subgrade

The subgrade soils for the fields will consist of stiff to very stiff to hard Fat Clay (CH) & Lean Clay (CL). We recommend that at least eight inches of the subgrade be stabilized with 5% of lime on baseball field and with 6% of lime on softball field for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term

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pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications.

8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

At the baseball concession stand location, we recommend moisture conditioning the onsite soil. In order to use the existing soils, the top 3 feet of soil should be excavated, placed on the site and moisture content be added to about (+3) percentage points of the optimum value. After mixing backfill the soils. While backfilling, soils should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density. We recommend the moisture conditioned area to extend horizontally at least 5 feet beyond the edge of the proposed structure.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of

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poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

10 DESIGN REVIEW

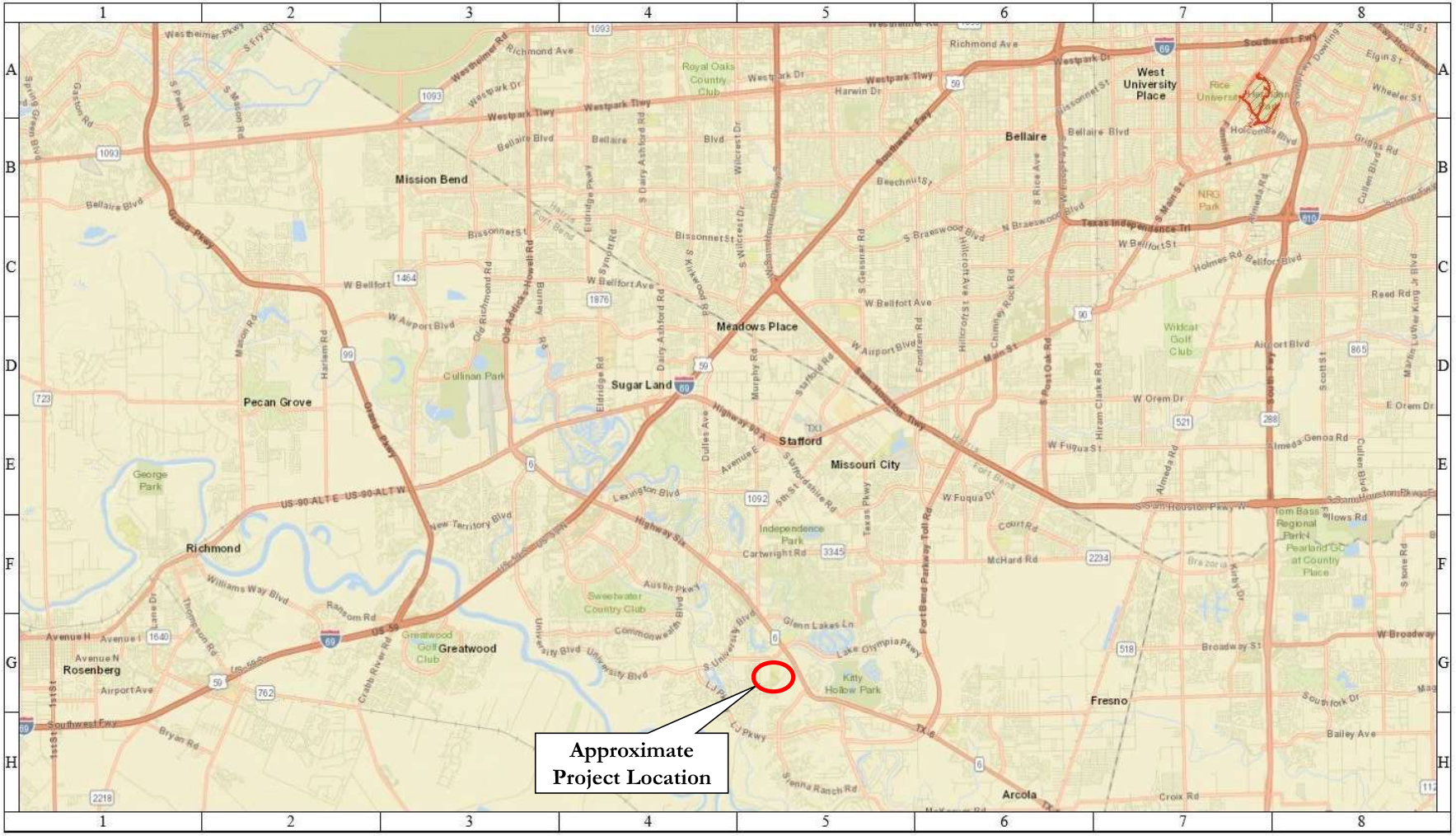
HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Elkins High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

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PLATES



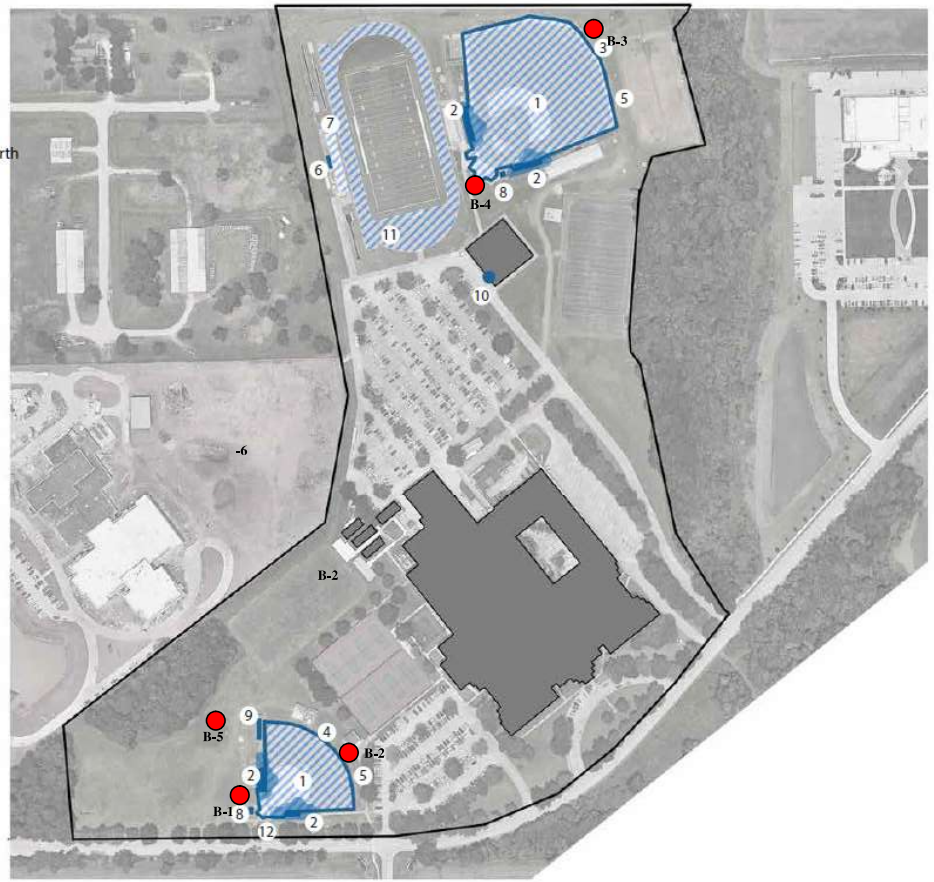
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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- E	PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. Press box renovation
7. Football Bleachers- Add railing, Replace stairs on North
8. New Consession-Ticket stand, RR
9. New covered Hitting Cage
10. Replace Washer/Dryer
11. Synthetic Track Surface
12. New Press box



SECONDARY SUPPORT WORK
EXISTING BUILDINGS
NEW WORK
PRIMARY SITE WORK

0 50' 100' 150' 250' 450'
GRAPHIC BARSCALE

SITE PLAN NEW
SCALE : 1/128" = 1'-0"

N

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Sheet No:4

LEGEND:

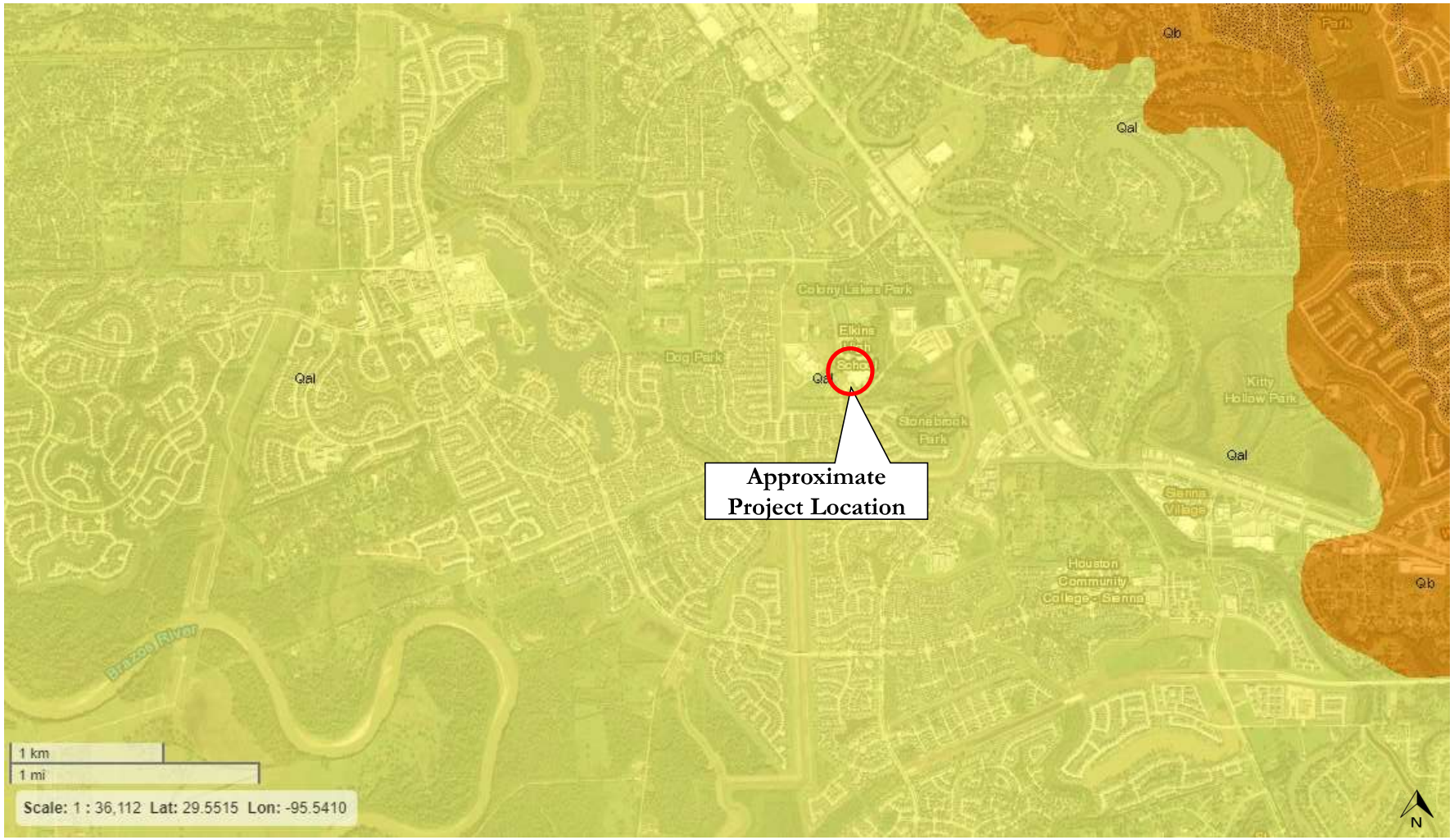
APPROXIMATE BORING LOCATIONS

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.: HG1810383.17-E	DRAWING NO.: PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qal

Alluvium (Qal) – Clay, silt, and sand, organic matter abundant locally; includes point bar, natural levee, stream channel, and backswamp deposits, many small inliers of Tertiary formations, and along minor streams small outcrops of Deweyville and Pleistocene formations.

Qb
Qb-stipled

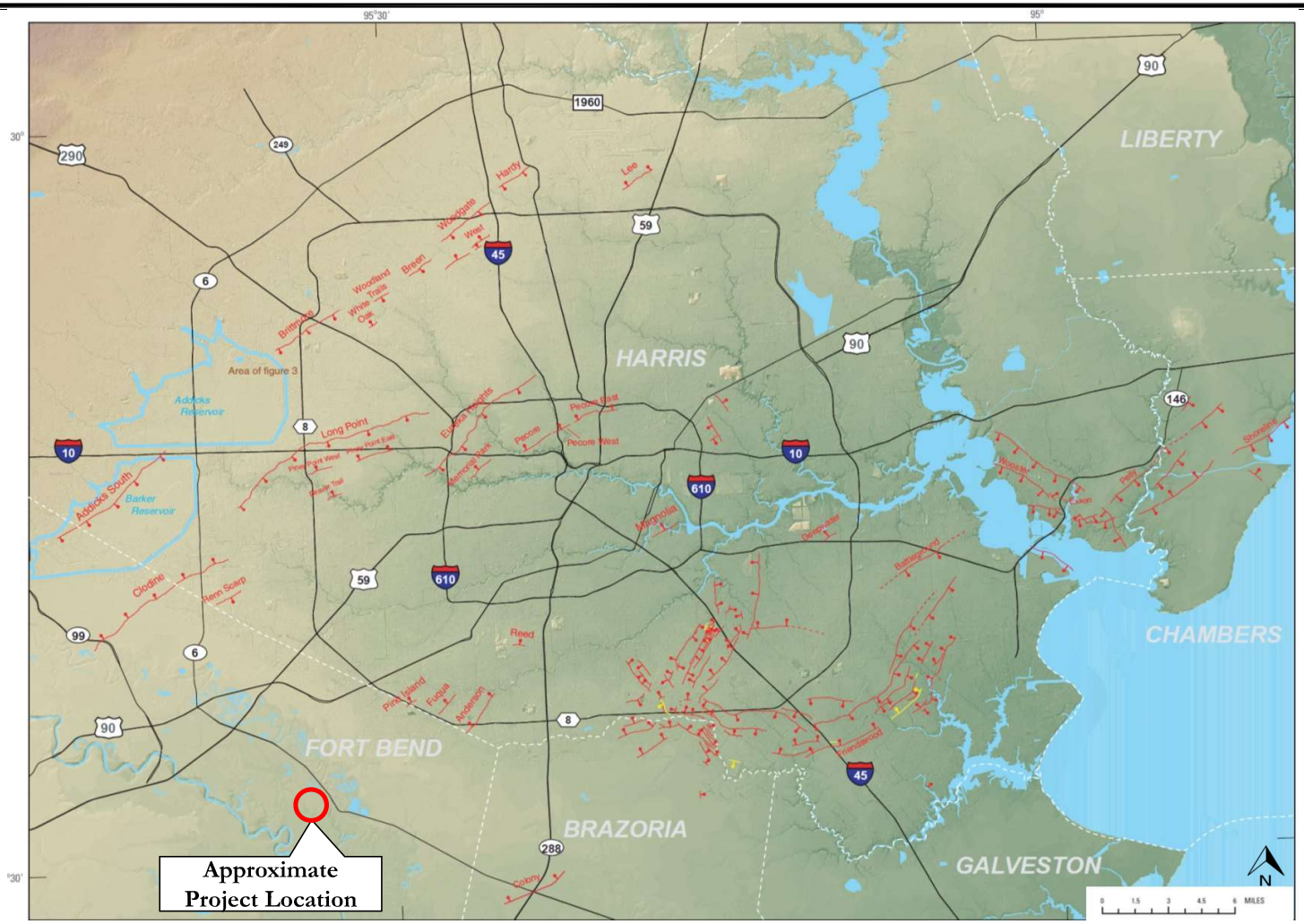
Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.: HG1810383.17- E	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- E	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'39.30"N; 95°33'38.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 25 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 25 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Very stiff to hard, dark brown and brown, FAT CLAY (CH) - with roots at 0'- 6'		90.2		14	64	29	35
60	5	- with calcareous nodules and ferrous stains at 4'- 6'			113	20			
		Very stiff, reddish brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'- 12'		91.0		11	32	19	13
55	10				110	14			
				96.6		18	39	26	13
		Firm to stiff, reddish brown, FAT CLAY (CH) - with calcareous nodules at 12'- 20'							
50	15			96.0		31	76	30	46
					91	30			
45	20								
40	25				107	18			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'40.50"N; 95°33'35.10"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff, dark brown, FAT CLAY (CH) - with roots and calcareous nodules at 0'-4'				20			
						90.1		28	71	24	47
60				Very stiff to hard, dark brown, LEAN CLAY WITH SAND (CL) - with calcareous nodules at 4'-10'							
	5						109	18			
						84.3	112	19	41	16	25
55	10										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

3.28

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

COH HG1810383.17 (ELKINS HS).GPJ 12/13/23

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LOG OF BORING B-3

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'58.80"N; 95°33'28.20"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 63.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff, dark brown and brown, LEAN CLAY (CL)				20	48	20	28
				- with root at 0'- 4'							
60											
				- with calcareous nodules at 4'- 10'							
	5					95.1		20	44	17	27
								11			
55											
	10					95.5	117	14	45	15	30

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'54.80"N; 95°33'31.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 20 FT
DATE: 11//7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff to hard, dark brown, LEAN CLAY WITH SAND (CL) - with roots at 0'- 6'		81.1	111	14	38	17	21
60	5					83.1		11	38	15	23
							117	17			
55	10			Stiff, dark brown and reddish brown, FAT CLAY (CH) - with calcareous nodules at 8'- 16'		92.5		26	66	22	44
						97.6		30	68	21	47
50	15						99	30			
				Firm, reddish brown, LEAN CLAY (CL) - with gravel at 18'- 20'		90.1		23	26	15	11
45	20						109	23			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

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LOG OF BORING B-5

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'41.10"N; 95°33'39.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 63.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'- 6'				16			
				- with calcareous nodules and ferrous stains at 2'- 6'							
60						93.5	103	21	69	21	48
	5							15			
				Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules at 6'- 10'							
55						97.6		19	31	14	17
	10										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

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SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

ELKINS HS

PROJECT NO.: HG1810383.17- E

DRAWING NO.: PLATE 6

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APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Elkins HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-E

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1									1.50
B-1	3	64	29	35	90.2	14				1.50
B-1	5					20	136	2.99		1.50
B-1	7	32	19	13	91.0	11				1.25
B-1	9					14	125	1.44		1.50
B-1	11	39	26	13	96.6	18				1.33
B-1	13									0.75
B-1	15	76	30	46	96.0	31				0.67
B-1	17					30	118		0.48	0.67
B-1	19									0.58
B-1	24					18	126		0.49	0.58
B-2	1					20				1.50
B-2	3	71	24	47	90.1	28				1.17
B-2	5					18	129	3.28		1.50
B-2	7	41	16	25	84.3	19	133	2.00		1.33
B-2	9									1.42
B-3	1	48	20	28		20				1.50
B-3	3									1.50
B-3	5	44	17	27	95.1	20				1.50
B-3	7					11				1.50
B-3	9	45	15	30	95.5	14	134	1.80		1.50
B-4	1	38	17	21	81.1	14	134	2.48		1.50
B-4	3									1.50
B-4	5	38	15	23	83.1	11				1.50
B-4	7					17	137	1.95		1.50
B-4	9	66	22	44	92.5	26				0.75
B-4	11									0.58
B-4	13	68	21	47	97.6	30				0.67
B-4	15					30	129		0.59	0.67
B-4	17	26	15	11	90.1	23				0.42
B-4	19					23	134		0.26	0.33
B-5	1					16				1.50
B-5	3	69	21	48	93.5	21	124	2.96		1.50
B-5	5					15				1.50
B-5	7	31	14	17	97.6	19				1.50
B-5	9									1.50
Total		**16**	**16**	**16**	**15**	**28**	**12**	**8**	**4**	**36**

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GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Willow Ridge High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

October 09, 2025

REPORT NO. HG1810383.17 –D

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

HVJ ASSOCIATES

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October 9, 2025

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Willowridge High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17- D

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

P. Dahal

Prakash Dahal, PE
Project Engineer



10/09/2025

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on October 9, 2025. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Willowridge HS. The improvements at Willowridge HS involves replacement of softball and baseball press box. This also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at the softball and baseball fields. In addition, a new fence is planned at tennis court. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the softball and baseball press box was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 20 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. Notably, cohesionless soil (ML) was observed in boring B-3 at a depth between 14 and 20 feet. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review of surface faults near the project area was conducted based on the Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas Houston Sheet, Paul Weaver Memorial Edition (revised in 1982). The primary objective of this review was to evaluate available information from published and open file reports. Based on the review, the project site is situated approximately 1-3 miles south of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was not encountered below the existing grade in any of the borings during the drilling operations. All the borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7

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feet of soil within the proposed restroom and storage building area are presented in the table below.

Potential Vertical Rise for the Onsite Soils

Structure	Borings No.	PVR (inches)		
		Dry	Average	Existing
Softball Press Box	B-1	3.39	2.63	3.05
Baseball Press Box	B-3	2.73	2.19	2.73

We anticipate that the softball and baseball press box structures are planned to be supported by a shallow foundation system consisting of slab-on-grade. For these structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields and tennis court fence are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Willowridge HS. The improvements at Willowridge HS involves replacement of softball and baseball press box. This also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. In addition, a new fence is planned at tennis court. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for above mentioned structures.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 20 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed on November 2nd, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling two (2) soil borings to a depth of 20 feet and two (2) soil borings to a depth of 10 feet for net poles and softball and baseball press boxes and fields and one (1) boring to a depth of 15 feet for tennis court fence. The borings B-1, B-2, B-3 and B-4 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°35'12.60"N	95°28'45.30"W	70.0
B-2	29°35'14.1"N	95°28'42.8"W	69.0
B-3	29°35'10.5"N	95°28'41.1"W	69.0
B-4	29°35'13.5"N	95°28'37.6"W	67.0
B-5	29°35'05.1"N	95°28'50.3"W	69.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

Attempts were made to measure the groundwater during the drilling operations. Groundwater readings observed in the borings are discussed in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification

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testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	35
Atterberg Limits (ASTM D4318)	18
Percent Passing No. 200 Sieve (ASTM D1140)	18
Unconfined Compression (ASTM D2166)	12
Unconsolidated-Undrained (ASTM D2850)	2

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

There are two major surface geological formations that exist in the Gulf area: the Beaumont formation and the Lissie formation. The Beaumont formation is a relatively younger formation generally found to the southeast of the Lissie formation. The Beaumont formation dips southeastward and extends beneath beach sand and waters of the Gulf of Mexico as far as the continental shelf. The project site is located in an area where the Beaumont formation is typically encountered. A geology map is presented on Plate 3.

The Beaumont formation was deposited on land near sea level in flat river deltas and in inter-delta regions. Soil deposition occurred in fresh water streams and in flood plains (as backwater marsh and natural levees). The courses of major streams and deltaic tributaries changed frequently during the period of deposition, generating within the Beaumont clay a complex stratification of sand, silt and clay deposits. Frequently, stream courses were diverted significant distances from a given point in a backwater marsh, and the water overlying the soil would evaporate since it was cut off from a drainage path. Such water, which would be highly alkaline, would precipitate large nodules of calcium carbonate (calcareous nodules) throughout the surface of evaporation. With the coming of the Second Wisconsin Ice Age, the nearby sea withdrew, leaving the formation several hundred feet above sea level and permitting the soil to desiccate. The process of desiccation compressed the clays

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in the formation such that they became significantly over-consolidated to a large depth. In addition to pre-consolidating the soil, the process of desiccation, together with the later rewetting, produced a network of fissures and slickensides that are now closed but which represent potential planes of weakness in the soil.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review of surface faults near the project area was conducted based on the Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas Houston Sheet, Paul Weaver Memorial Edition (revised in 1982). The primary objective of this review was to evaluate available information from published and open file reports. Based on the review, the project site is situated approximately 1-3 miles south of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. Notably, cohesionless soil (ML) with clay seams was observed in boring B-3 at a depth between 14 and 20 feet. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Attempts were made to measure the groundwater during the drilling operations. However, groundwater was not encountered below the existing grade in any of the borings. All the borings were dry until the termination depth.

It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

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6 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL PRESS BOX

6.1 General

The project involves the construction of a softball and baseball press box at Willowridge High School. Information related to the proposed foundation system to support these buildings was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the slab-on-grade foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the softball and baseball press box locations are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Softball Press Box	B-1	3.39	2.63	3.05
Baseball Press Box	B-3	2.73	2.19	2.73

6.3 Slab-on-grade Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

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The softball and baseball press box buildings may be supported on a slab-on-grade foundation system provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab.

For softball and baseball press box structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 5 feet of on-site soils with select compacted fill. We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical professionals to identify any soft or weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS AND TENNIS FENCE

7.1 General

We understand that the proposed improvements at Willowridge High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field and baseball field to support the netting. This will also include installation of new fence at tennis court. The replacement of synthetic turf at softball and baseball fields is proposed too.

7.2 Softball and Baseball Netting Poles and Tennis Court Fence

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to resist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation.

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For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.19. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 98 pcf for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 4 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-1 & B-2	7-8	Stiff Clay	2,000
Softball Pole	B-3 & B-4	6-8	Stiff Clay	2,000
Tennis Court Fence	B-5	4-8	Stiff Clay	2,000

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 4 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Based on the cross section provided by Texas Sports and Civil Engineering, the synthetic turf will be installed over 2 inches of fine stone, underlain by 6 inches of base stone and compacted subgrade. The provided cross section is included in Appendix C. At the request of Texas Sports & Civil Engineering and pfluger, we have presented below the PVR values for three conditions: (1) without lime treatment of the subgrade, (2) with lime treatment of subgrade to a depth of 8 inches and, (3) lime treatment of subgrade to a depth of 16 inches below 8 inches stone.

Table 7-2 – PVR for Synthetic Turf

Location	Borings Used	PVR (inches)		
		No Treatment [1]	8" pavement+ 8" Lime Treated[2]	8" pavement+ 16" Lime Treated[3]
Baseball	B-3/B-4	3.02	2.68	2.05
Softball	B-1/B-2	3.39	3.03	2.35

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Note:

1. **No Treatment:** Turf + 2" Fine Stone + 6" Base Stone with no lime treatment. In this case, 8" of soil will be excavated and replaced with stone.
2. **8" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 8". Here, 16" of soil will be excavated; the bottom 8" will be treated with lime, backfilled, compacted, and then overlaid with 8" of stone.
3. **16" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 16". In this case, 24" of soil will be excavated; the bottom 16" will be treated with lime, backfilled, compacted, and overlaid with 8" of stone.

We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.4 for the subgrade preparation recommendations. The depth of subgrade treatment for synthetic turf will vary depending upon the PVR based on the table above.

7.4 Preparation of Subgrade

The subgrade soils for the fields will consist of firm to very stiff Fat Clay (CH). We recommend that at least eight inches of the subgrade be stabilized with 6% of lime for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications. Subgrade stabilization/treatment should extend a minimum of two feet beyond the edge of the proposed fields.

8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be

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replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

10 DESIGN REVIEW

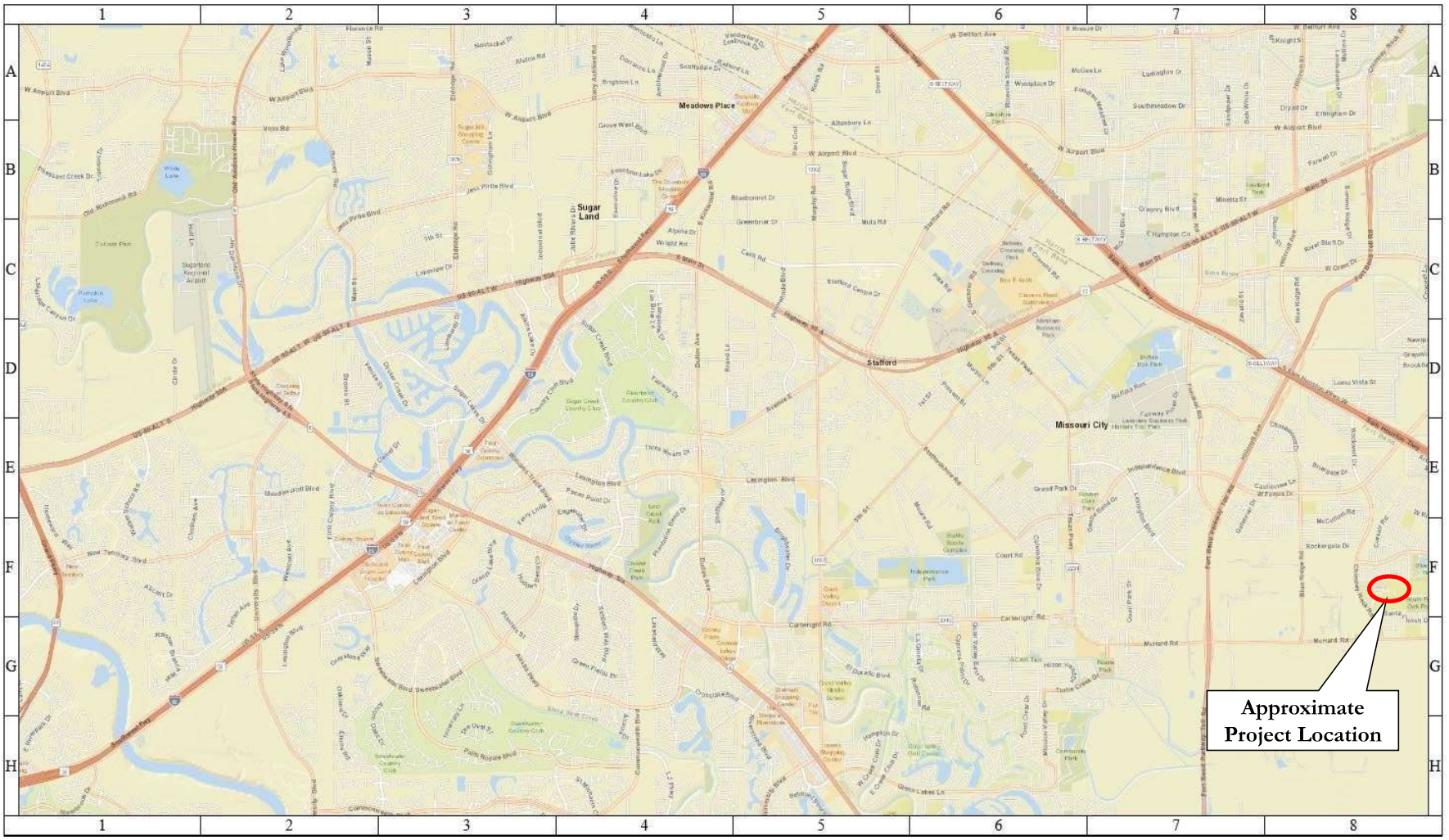
HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Willowridge High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

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PLATES



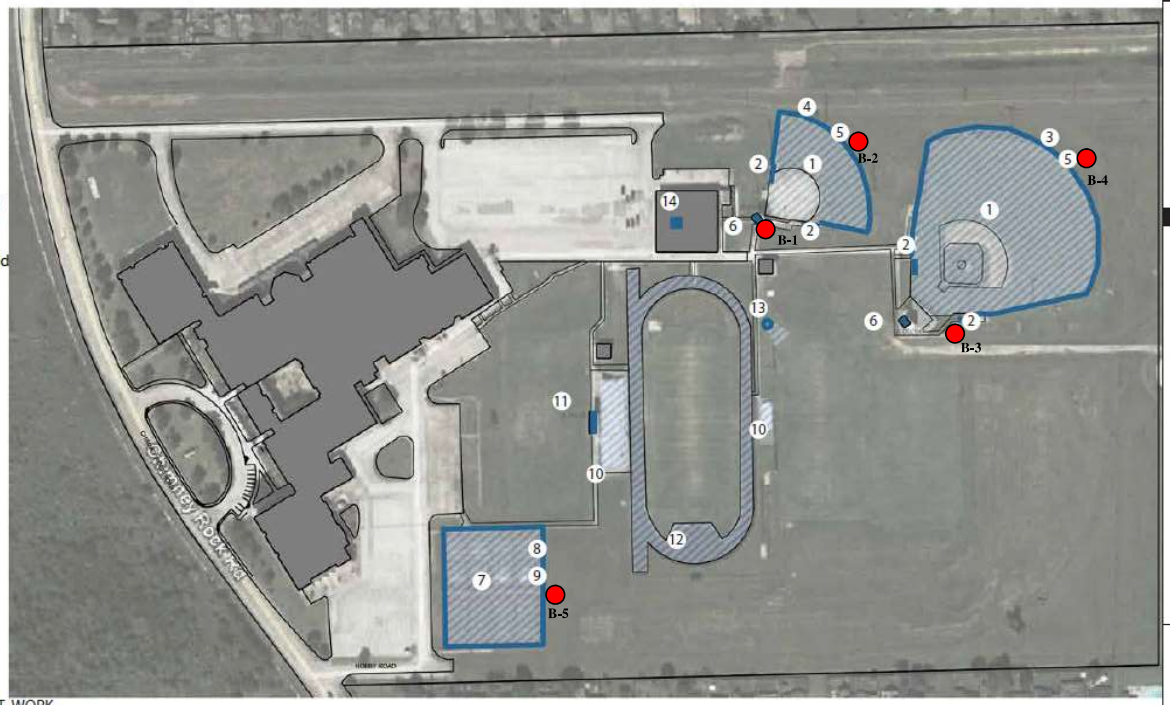
HVJ ASSOCIATES
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Houston, Texas 77072-1010
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281.933.7293 Fax

DATE: 11/16/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17- D	DRAWING NO.: PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. Replace Press Box
7. Tennis Court Resurfacing
8. Tennis New Fence
9. Tennis Windscreen
10. Renovate Football Bleachers
11. Renovate Football Press Box
12. Synthetic Track Resurfacing
13. Discus cage and concrete pad
14. Training Room



SECONDARY SUPPORT WORK

EXISTING BUILDINGS

NEW WORK

PRIMARY SITE WORK

0 50' 100' 150' 250' 450'

GRAPHIC BARSCALE

SITE PLAN NEW

N

SCALE : 1/128" = 1'-0"

pfluger

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16301 Chimney Rock Rd, Houston, TX 77053

FBISD
INSPIRE • EQUIP • IMAGINE
16431 Lexington Blvd.
Sugar Land, TX 77479

Sheet No:14

LEGEND:

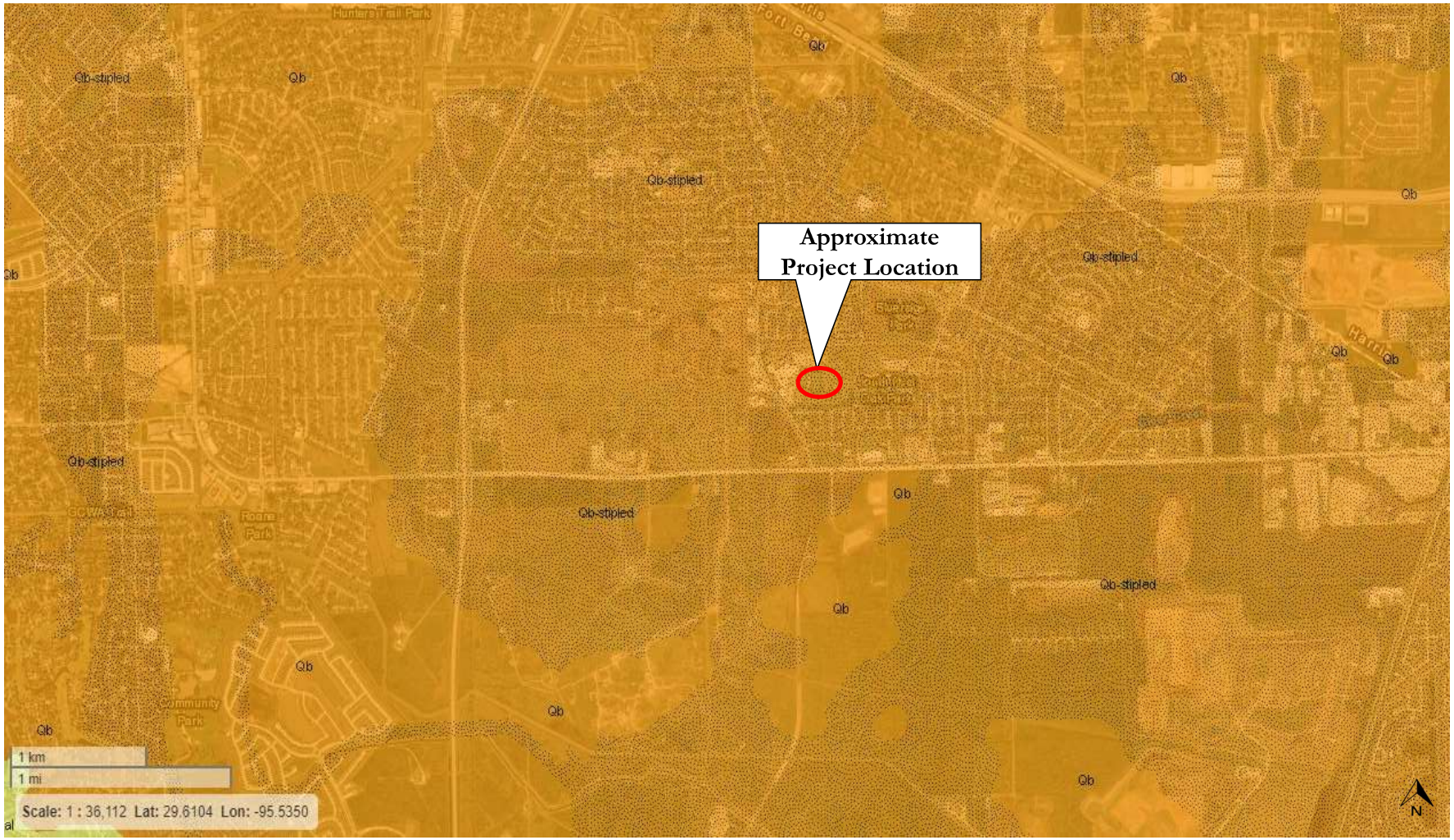
APPROXIMATE BORING LOCATIONS

HVJ ASSOCIATES
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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17-D	DRAWING NO.: PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qb/ Qb-Stipled

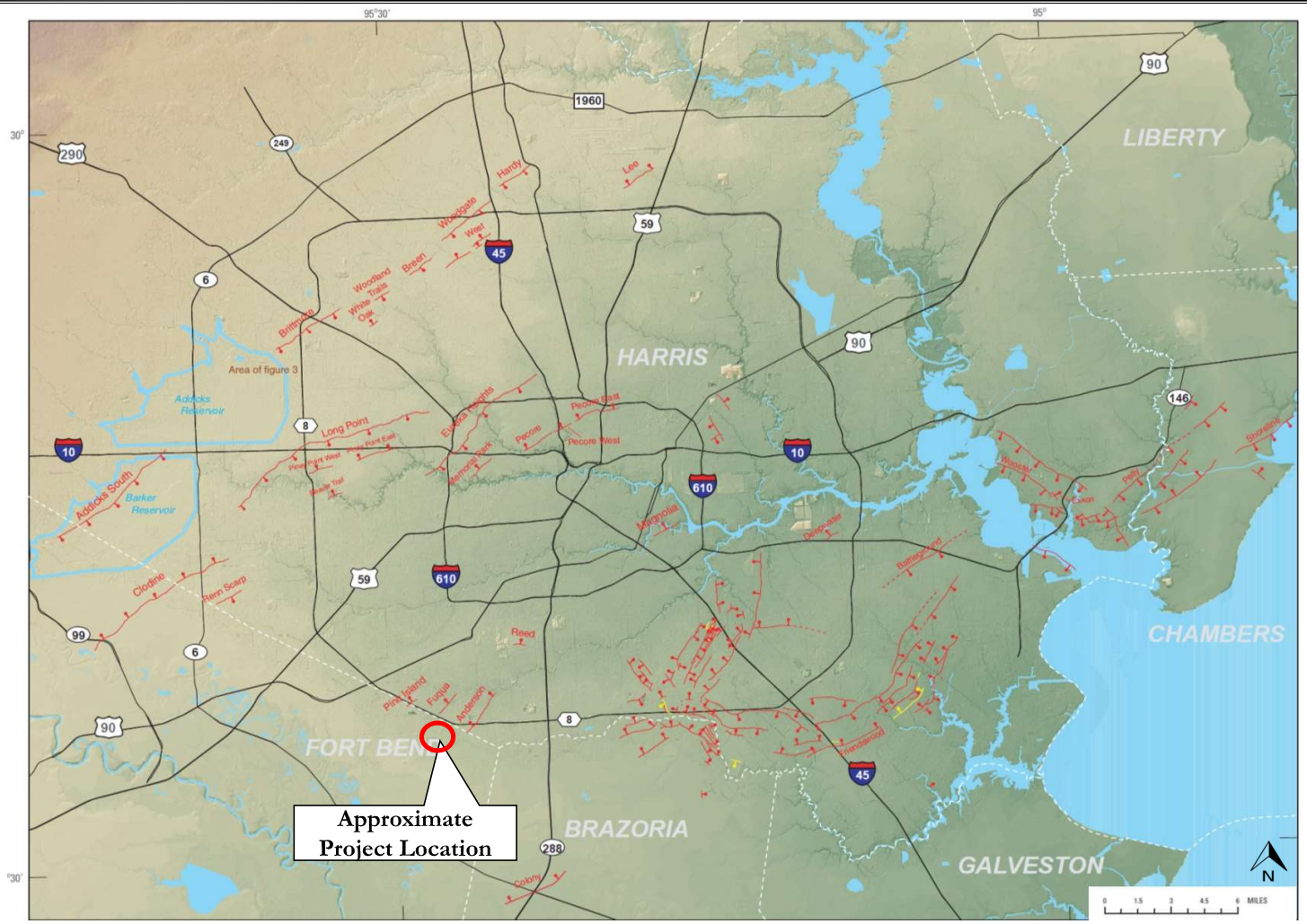
Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

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DATE: 11/16/2023	APPROVED BY: PD	PREPARED BY: EG

GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17- D	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/16/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- D	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'12.60"N; 95°28'45.30"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 70.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 20 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
70	0	Firm to stiff, dark brown, brown and gray, FAT CLAY (CH)				27			
				90.3		27	76	27	49
65	5				92	30			
		- with calcareous nodules and ferrous stains at 6'-8'		93.8		28	66	25	41
		Firm to very stiff, reddish brown, LEAN CLAY (CL)			104	24			
60	10	- with calcareous nodules and ferrous stains at 8'-16'		97.4		21	35	22	13
					105	19			
55	15			97.3		23	42	24	18
					100	28			
50	20					10			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'14.1"N; 95°28'42.8"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 10 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Stiff to very stiff, dark brown to brown and gray, FAT CLAY (CH)							
						89.7		26	62	22	40
65	5						96	27			
				- with calcareous nodules and ferrous stains at 6'-8'		90.5		28	67	24	43
				- with calcareous nodules at 8'-10'							
60	10						111	19			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

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LOG OF BORING B-3

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'10.5"N; 95°28'41.1"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 20 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Very stiff, drak brown, FAT CLAY WITH SAND (CH) - with roots at 0'-4'		81.9		18	58	19	39
65	5	Very stiff, drak brown to brown, FAT CLAY (CH)		90.0		23	69	19	50
		Stiff to hard, brown and gray, LEAN CLAY WITH SAND (CL) - with calcareous nodules at 6'-12'			119	13			
60	10			82.5		18	40	11	29
					112	14			
		Very stiff, brown and gray, FAT CLAY (CH) - with calcareous nodules at 12'-14'		94.7		24	55	19	36
55	15	Brown, SILT (ML) - with clay seams at 14'-20'				20			
				87.0		17	NP	NP	NP
50	20					13			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'13.5"N; 95°28'37.6"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 67.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 10 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Stiff to very stiff, dark brown to brown and gray, FAT CLAY (CH)				25			
65				86.6	99	26	65	18	47
	5			86.0		25	64	21	43
		- with calcareous nodules and ferrous stains at 6'-8'							
60					110	18			
		- with calcareous nodules at 8'-10'							
				91.7		22	57	21	36
	10								

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-5

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'05.1"N; 95°28'50.3"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 15 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 15 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Stiff to very stiff, dark brown, reddish brown and gray, FAT CLAY (CH) - with roots at 0'-2'		90.5		27	74	24	50
65	5	- with calcareous nodules at 4'-14'			99	24			
		- with gravel at 6'-8'		89.0		27	63	21	42
60	10	- with ferrous stains at 8'-15'			108	19			
				99.0		29	71	25	46
					97	27			
55	15			99.5	103	25	67	23	44

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

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SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

HVJ ASSOCIATES
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Houston, Texas 77072-1010
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281.933.7293 Fax

KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

WILLOWRIDGE HS

PROJECT NO.: HG1810383.17- D

DRAWING NO.: PLATE A-6

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APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Willow Ridge HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17- D

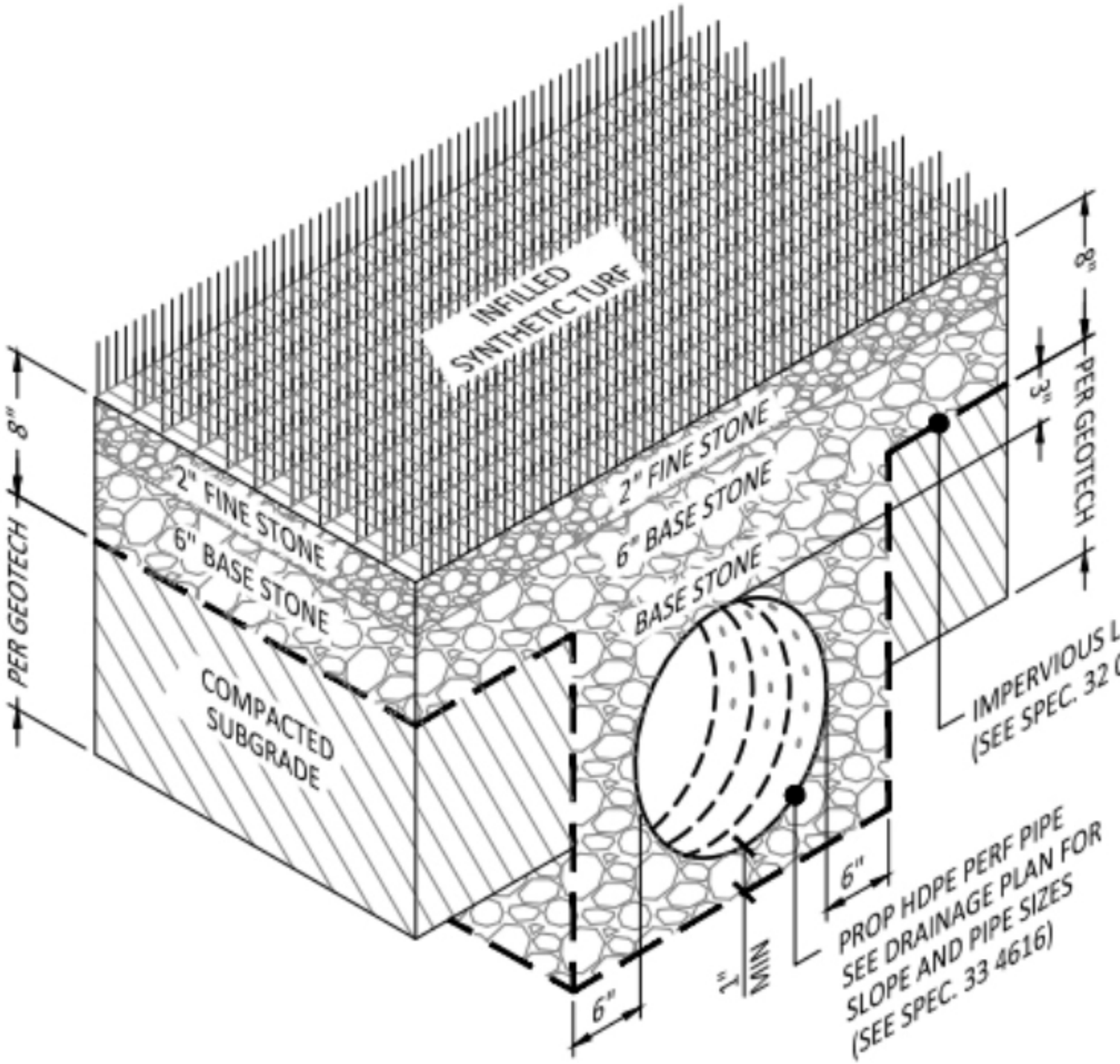
Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1					27				0.42
B-1	3	76	27	49	90.3	27				0.50
B-1	5					30	120	0.65		0.58
B-1	7	66	25	41	93.8	28				0.83
B-1	9					24	129	0.85		0.75
B-1	11	35	22	13	97.4	21				1.33
B-1	13					19	125	0.50		1.33
B-1	15	42	24	18	97.3	23				1.50
B-1	17					28	128		1.15	1.25
B-1	19					10				0.42
B-2	1									0.83
B-2	3	62	22	40	89.7	26				0.75
B-2	5					27	122	0.63		0.67
B-2	7	67	24	43	90.5	28				0.75
B-2	9					19	132	0.98		1.50
B-3	1	58	19	39	81.9	18				1.50
B-3	3									1.50
B-3	5	69	19	50	90	23				1.50
B-3	7					13	134	2.73		1.50
B-3	9	40	11	29	82.5	18				1.50
B-3	11					14	128	0.86		1.50
B-3	13	55	19	36	94.7	24				1.25
B-3	15					20				0.42
B-3	17	NP	NP	NP	87.0	17				0.50
B-3	19					13				0.58
B-4	1					25				1.00
B-4	3	65	18	47	86.6	26	125	0.69		0.58
B-4	5	64	21	43	86	25				0.67
B-4	7					18	130	1.81		1.50
B-4	9	57	21	36	91.7	22				1.25
B-5	1									1.17
B-5	3	74	24	50	90.5	27				0.92
B-5	5					24	123	1.19		0.92
B-5	7	63	21	42	89.0	27				1.17
B-5	9					19	129	0.64		1.25
B-5	11	71	25	46	99.0	29				1.25
B-5	13					27	123	0.95		1.33
B-5	14.5	67	23	44	99.5	25	129		1.52	1.17
Total		**18**	**18**	**18**	**18**	**35**	**14**	**12**	**2**	**38**

NP: Non- Plastic

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APPENDIX C

SYNTHETIC TURF CROSS SECTION



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8 N.T.S.

INFILLED SYNTHETIC TURF TRENCH SECTION

GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Elkins High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

October 09, 2025

REPORT NO. HG1810383.17 –E

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

HVJ ASSOCIATES

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October 9, 2025

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Elkins High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17-E

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

P. Dahal

Prakash Dahal, PE
Project Engineer



10/09/2025

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on October 9, 2025. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Elkins HS. The improvements at Elkins HS involves construction of a new concession stand at softball and baseball fields and a press box and hitting cage at/near the softball field. They also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at the softball and baseball fields. The replacement of the synthetic track surface is also planned. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the concession stand, press box and hitting cage was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 25 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 6 miles southwest of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was not encountered the existing grade in any of the borings during the drilling operations. All the borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7

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feet of soil at the concession stand, press box and hitting cage locations are presented in the table below.

Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Baseball Concession Stand	B-4	1.23	0.73	1.23
Softball Concession Stand & Press Box	B-1	2.08	1.71	2.08
Hitting Cage	B-5	2.94	2.45	2.89

We anticipate that the baseball and softball concession stands, press box and hitting cage are planned to be supported by a shallow foundation system consisting of slab-on-grade.

For baseball concession stand location the PVR is less than 1 inch for the average condition but not for the existing-dry condition. At this location, we recommend using the onsite soil. In order to use the existing soils, the top 3 feet of soil after excavation should be moisture conditioned and compacted. The other way to reduce PVR to less than 1 inch at this location is placing the slab-on-grade on a 2-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 2 feet of on-site soils with select compacted fill.

However, for softball concession stand, press box and hitting cage structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot-thick pad prepared with properly compacted and moisture conditioned structural fill. The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields and synthetic track surface are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

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2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Elkins HS. The improvements at Elkins HS involves construction of a new concession stand at the softball and baseball fields, and a press box and hitting cage at/near the softball field. They also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. The replacement of synthetic track surface is also planned. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 25 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed on November 7th, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling one (1) boring to a depth of 25 feet for softball press box, concession stand and net pole, one (1) boring to a depth of 20 feet for baseball net poles, one (1) boring to a depth of 15 feet for softball hitting cage and two (2) borings to a depth of 10 feet for softball and baseball fields. The borings B-1, B-2, B-3 and B-4 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings except for boring B-1, where the sampling was performed continuously to 20 feet and at 5 feet interval until the termination depth of 25 feet. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°32'39.30"N	95°33'38.40"W	64.0
B-2	29°32'40.50"N	95°33'35.10"W	64.0
B-3	29°32'58.80"N	95°33'28.20"W	63.0
B-4	29°32'54.80"N	95°33'31.40"W	64.0
B-5	29°32'41.10"N	95°33'39.40"W	63.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

Attempts were made to measure the groundwater during the drilling operations. Groundwater readings observed in the borings are discussed in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification

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testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	28
Atterberg Limits (ASTM D4318)	16
Percent Passing No. 200 Sieve (ASTM D1140)	15
Unconfined Compression (ASTM D2166)	8
Unconsolidated-Undrained (ASTM D2850)	4

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

The project site is located in the Alluvium (map symbol Qal) formation in the vicinity of the Beaumont formation. The Alluvial deposits are heterogeneous in nature containing interbedded layers of clay, silt and sand. The depositional features include point-bar, natural levee, stream channel, backswamp, coastal marsh, mud-flat and narrow beach deposits. A geologic map is presented on Plate 3.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately

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6 miles southwest of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Attempts were made to measure the groundwater during the drilling operations. However, groundwater was not encountered below the existing grade in any of the borings. All the borings were dry until the termination depth.

It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

6 FOUNDATION RECOMMENDATIONS FOR CONCESSION STAND, PRESS BOX AND HITTING CAGE

6.1 General

The project involves the construction of a new concession stand at softball and baseball field, press box and hitting cage at/near softball field at Elkins High School. Information related to the proposed foundation system to support these structures was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the slab-on-grade foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

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Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the concession stand, press box and hitting cage locations are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Baseball Concession Stand	B-4	1.23	0.73	1.23
Softball Concession Stand & Press Box	B-1	2.08	1.71	2.08
Hitting Cage	B-5	2.94	2.45	2.89

6.3 Slab-on-grade Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

The concession stand, press box and hitting cage structures may be supported on a slab-on-grade foundation system provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab.

For the baseball concession stand location the PVR is less than 1 inch for average condition but not for existing-dry condition. At this location, we recommend using the onsite soil. Compaction and moisture conditioning for using existing soils should be in accordance with Section 8 of this report. The other way to reduce PVR to less than 1 inch at this location is placing the slab-on-grade on a 2-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 2 feet of on-site soils with select compacted fill.

However, for the softball concession stand, press box and hitting cage structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 5 feet of on-site soils with select compacted fill. We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical professionals to identify any soft or

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weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended for softball concession stand, press box and hitting cage structures. And for baseball concession stand a reaction modulus value of 150 pounds per cubic inch can be used.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS AND SYNTHETIC TRACK SURFACE

7.1 General

We understand that the proposed improvements at Elkins High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field to support the netting. Also, this involves replacement of synthetic turf at softball and baseball fields. In addition, this includes replacement of synthetic track surface at Elkins School.

7.2 Softball and Baseball Netting Poles

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to resist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation. For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.20. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 100 pcf for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 6 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

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Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-3 & B-4	7-8	Stiff Clay	2,000
Softball Pole	B-1 & B-2	6-8	Stiff Clay	2,000

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 6 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Based on the cross section provided by Texas Sports and Civil Engineering, the synthetic turf will be installed over 2 inches of fine stone, underlain by 6 inches of base stone and compacted subgrade. The provided cross section is included in Appendix C. At the request of Texas Sports & Civil Engineering and pfluger, we have presented below the PVR values for three conditions: (1) without lime treatment of the subgrade, (2) with lime treatment of subgrade to a depth of 8 inches and, (3) lime treatment of subgrade to a depth of 16 inches below 8 inches stone.

Table 7-2 – PVR for Synthetic Turf

Location	Borings Used	PVR (inches)		
		No Treatment [(1)]	8" pavement+ 8" Lime Treated[(2)]	8" pavement+ 16" Lime Treated[(3)]
Baseball	B-3/B-4	1.64	1.42	<1
Softball	B-1/B-5/B-2	2.94	2.60	1.94

Note:

1. **No Treatment:** Turf + 2" Fine Stone + 6" Base Stone with no lime treatment. In this case, 8" of soil will be excavated and replaced with stone.
2. **8" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 8". Here, 16" of soil will be excavated; the bottom 8" will be treated with lime, backfilled, compacted, and then overlaid with 8" of stone.
3. **16" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 16". In this case, 24" of soil will be excavated; the bottom 16" will be treated with lime, backfilled, compacted, and overlaid with 8" of stone.

We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.5 for the subgrade preparation

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recommendations. The depth of subgrade treatment for synthetic turf will vary depending upon the PVR based on the table above.

7.4 Synthetic Track Surface

The project includes replacement of synthetic track surface at Elkins School. Details of the replacement are not available at the time of writing this report. If the planned replacement includes replacing the asphalt beneath the current track surface we recommend that at least 8 inches of the subgrade be stabilized with 6% lime. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term performance by reducing the tendency of the soil to displace by pumping. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.5 for the subgrade preparation recommendations.

For soil-lime stabilization, scarify the upper 8 inches of exposed surface as required, mix with lime as described previously and compact it to 95 percent of standard Proctor maximum dry density (ASTM D 698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. It should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications.

7.5 Preparation of Subgrade

The subgrade soils for the fields will consist of stiff to very stiff to hard Fat Clay (CH) & Lean Clay (CL). We recommend that at least eight inches of the subgrade be stabilized with 5% of lime on baseball field and with 6% of lime on softball field for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications. Subgrade stabilization/treatment should extend a minimum of two feet beyond the edge of the proposed fields.

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8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

At the baseball concession stand location, we recommend moisture conditioning the onsite soil. In order to use the existing soils, the top 3 feet of soil should be excavated, placed on the site and moisture content be added to about (+3) percentage points of the optimum value. After mixing backfill the soils. While backfilling, soils should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density. We recommend the moisture conditioned area to extend horizontally at least 5 feet beyond the edge of the proposed structure.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

10 DESIGN REVIEW

HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

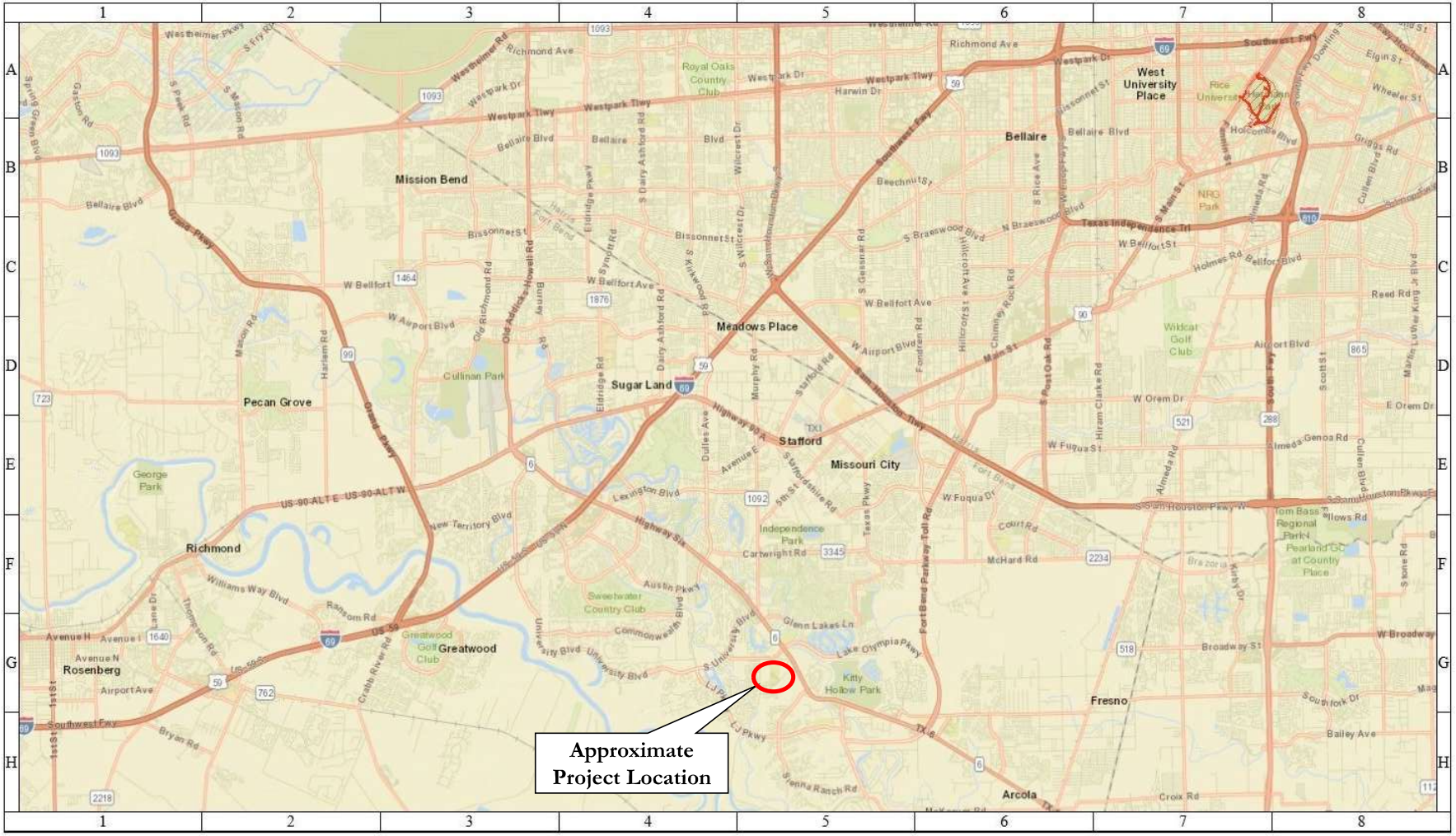
This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Elkins High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

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PLATES



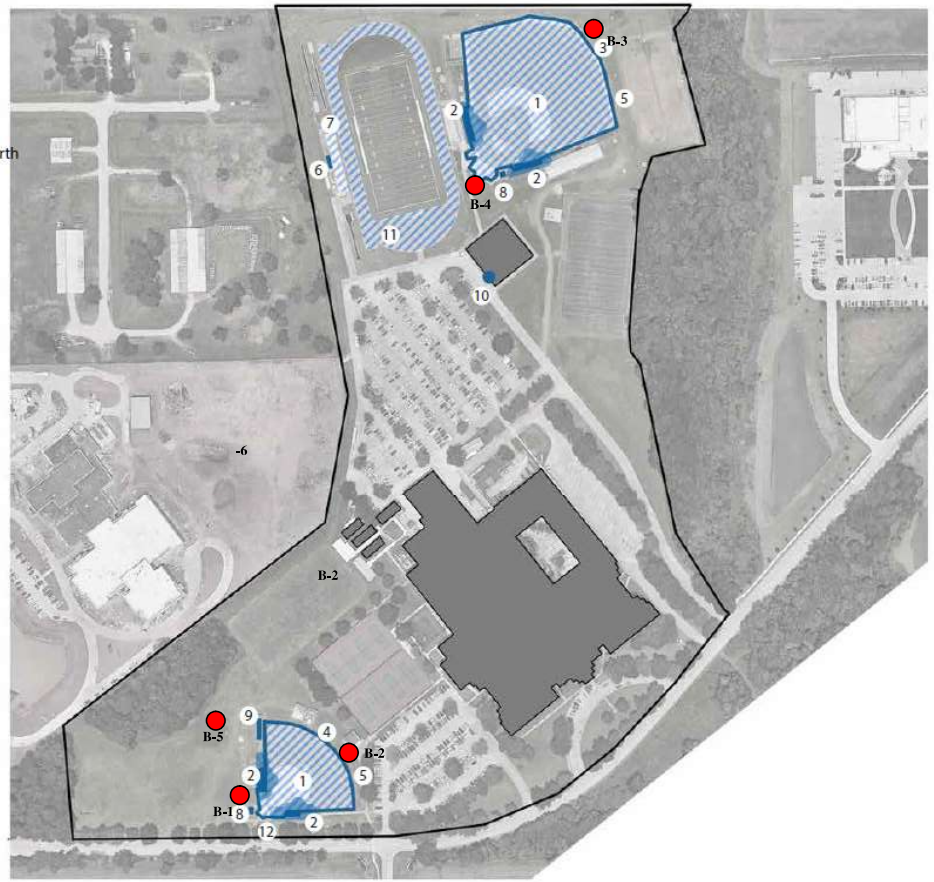
HVJ ASSOCIATES
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281.933.7293 Fax

DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- E	PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. Press box renovation
7. Football Bleachers- Add railing, Replace stairs on North
8. New Consession-Ticket stand, RR
9. New covered Hitting Cage
10. Replace Washer/Dryer
11. Synthetic Track Surface
12. New Press box



SECONDARY SUPPORT WORK
EXISTING BUILDINGS
NEW WORK
PRIMARY SITE WORK

0 50' 100' 150' 250' 450'
GRAPHIC BARSCALE

SITE PLAN NEW
SCALE : 1/128" = 1'-0"

N

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ELKINS HIGH SCHOOL
7007 Knights Court, Missouri City, TX 77459

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16431 Lexington Blvd.
Sugar Land, TX 77479

Sheet No:4

LEGEND:

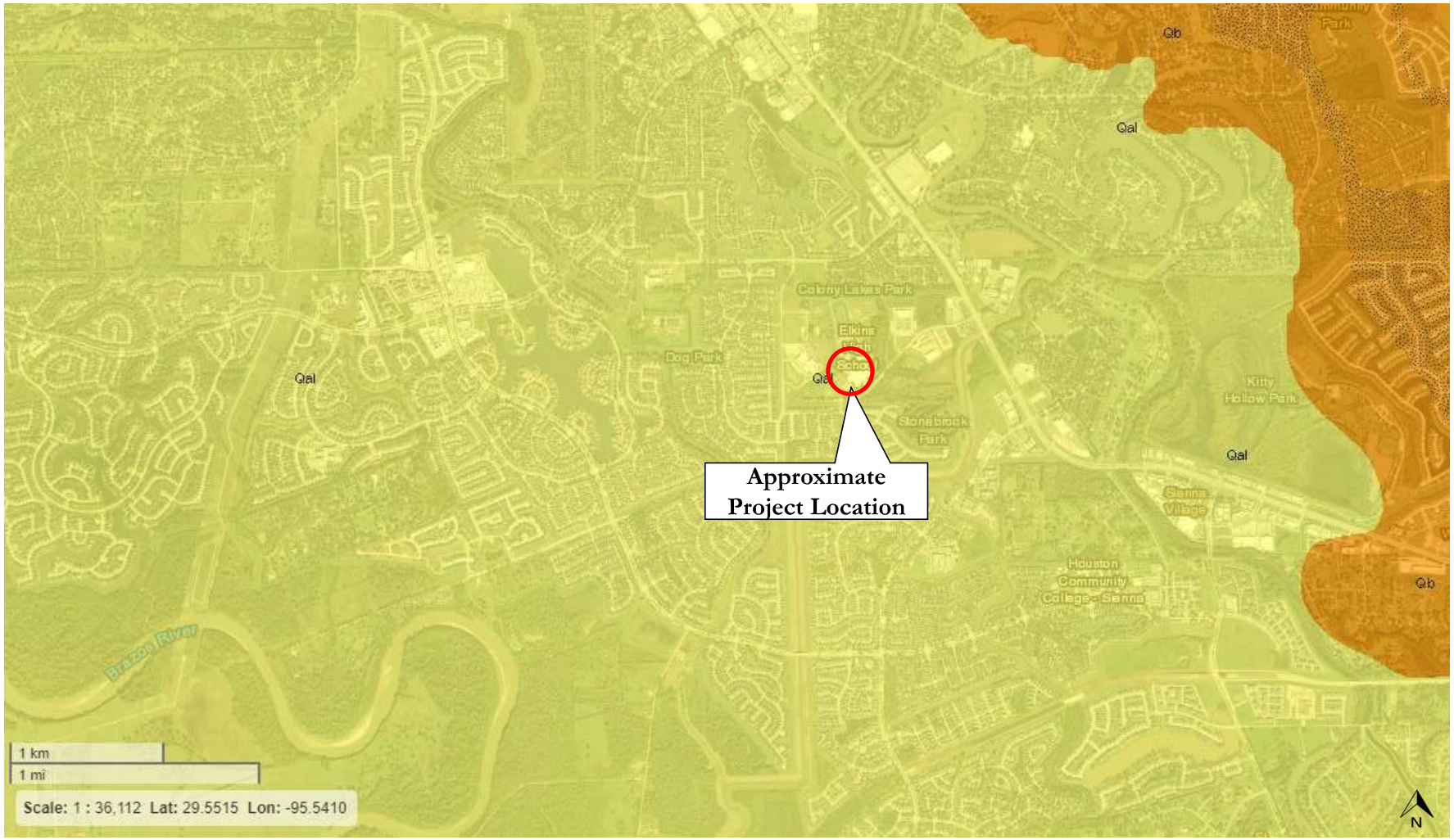
APPROXIMATE BORING LOCATIONS

HVJ ASSOCIATES
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PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.: HG1810383.17-E	DRAWING NO.: PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qal

Alluvium (Qal) – Clay, silt, and sand, organic matter abundant locally; includes point bar, natural levee, stream channel, and backswamp deposits, many small inliers of Tertiary formations, and along minor streams small outcrops of Deweyville and Pleistocene formations.

Qb
Qb-stipled

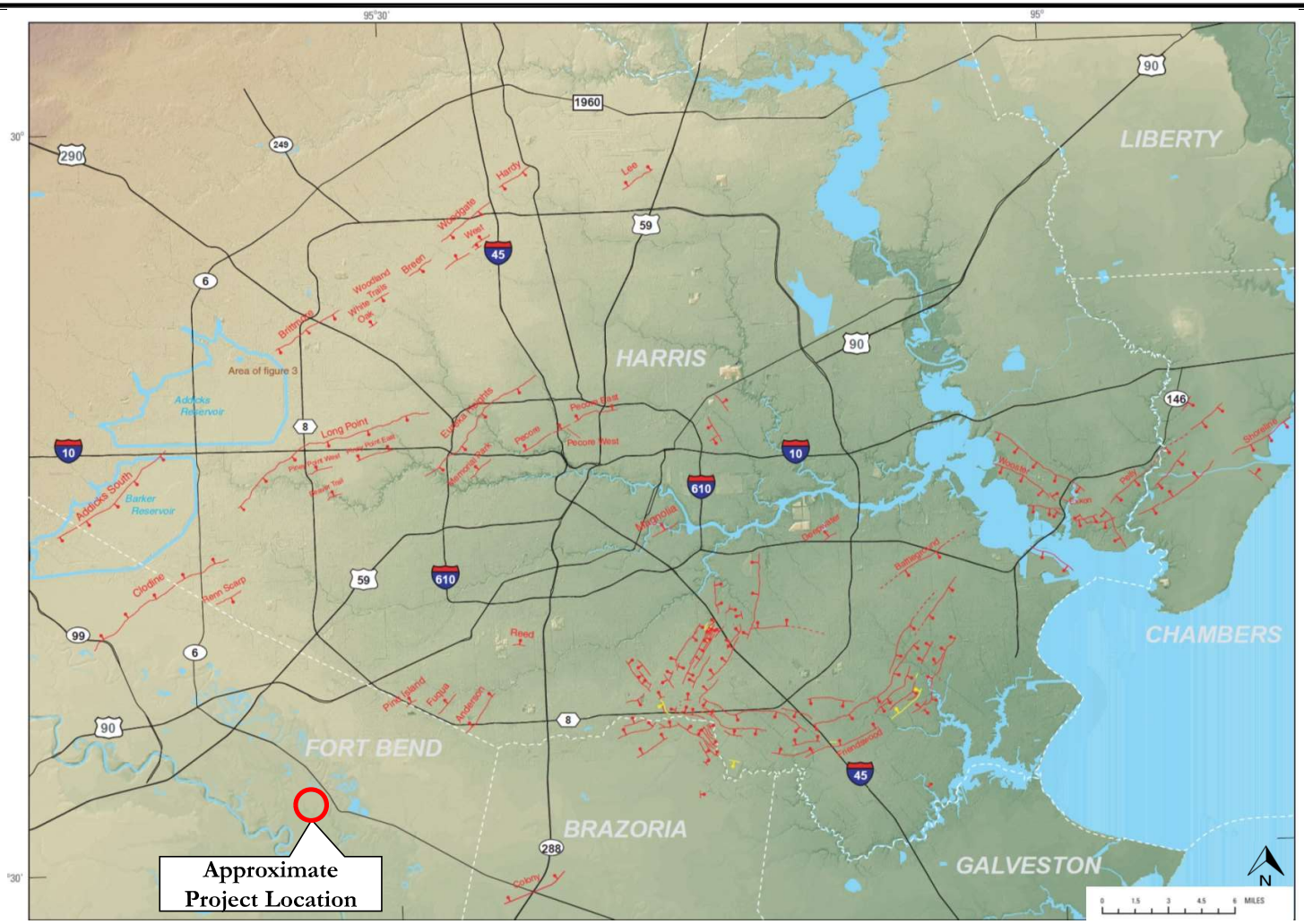
Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

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GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.: HG1810383.17- E	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (ELKINS HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- E	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'39.30"N; 95°33'38.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 25 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 25 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Very stiff to hard, dark brown and brown, FAT CLAY (CH) - with roots at 0'- 6'		90.2		14	64	29	35
60	5	- with calcareous nodules and ferrous stains at 4'- 6'			113	20			
		Very stiff, reddish brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'- 12'		91.0		11	32	19	13
55	10				110	14			
				96.6		18	39	26	13
		Firm to stiff, reddish brown, FAT CLAY (CH) - with calcareous nodules at 12'- 20'							
50	15			96.0		31	76	30	46
					91	30			
45	20								
40	25				107	18			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'40.50"N; 95°33'35.10"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff, dark brown, FAT CLAY (CH) - with roots and calcareous nodules at 0'-4'				20			
						90.1		28	71	24	47
60				Very stiff to hard, dark brown, LEAN CLAY WITH SAND (CL) - with calcareous nodules at 4'-10'							
	5						109	18			
						84.3	112	19	41	16	25
55	10										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

3.28

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

COH HG1810383.17 (ELKINS HS).GPJ 12/13/23

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-3

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'58.80"N; 95°33'28.20"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 63.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff, dark brown and brown, LEAN CLAY (CL)				20	48	20	28
				- with root at 0'- 4'							
60											
				- with calcareous nodules at 4'- 10'							
	5					95.1		20	44	17	27
								11			
55											
	10					95.5	117	14	45	15	30

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'54.80"N; 95°33'31.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 64.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 20 FT
DATE: 11//7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff to hard, dark brown, LEAN CLAY WITH SAND (CL) - with roots at 0'- 6'		81.1	111	14	38	17	21
60	5					83.1		11	38	15	23
							117	17			
55	10			Stiff, dark brown and reddish brown, FAT CLAY (CH) - with calcareous nodules at 8'- 16'		92.5		26	66	22	44
						97.6		30	68	21	47
50	15						99	30			
				Firm, reddish brown, LEAN CLAY (CL) - with gravel at 18'- 20'		90.1		23	26	15	11
45	20						109	23			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

COH HG1810383.17 (ELKINS HS).GPJ 12/13/23

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LOG OF BORING B-5

PROJECT: FBISD School Improvements- Turf & Athletics (Elkins HS)
LOCATION: 29°32'41.10"N; 95°33'39.40"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 63.0 FT

PROJECT NO.: HG1810383.17- E
COMPLETION DEPTH: 10 FT
DATE: 11/7/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'- 6'				16			
				- with calcareous nodules and ferrous stains at 2'- 6'							
60						93.5	103	21	69	21	48
	5							15			
				Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules at 6'- 10'							
55						97.6		19	31	14	17
	10										

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

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SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

ELKINS HS

PROJECT NO.: HG1810383.17- E

DRAWING NO.: PLATE 6

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APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

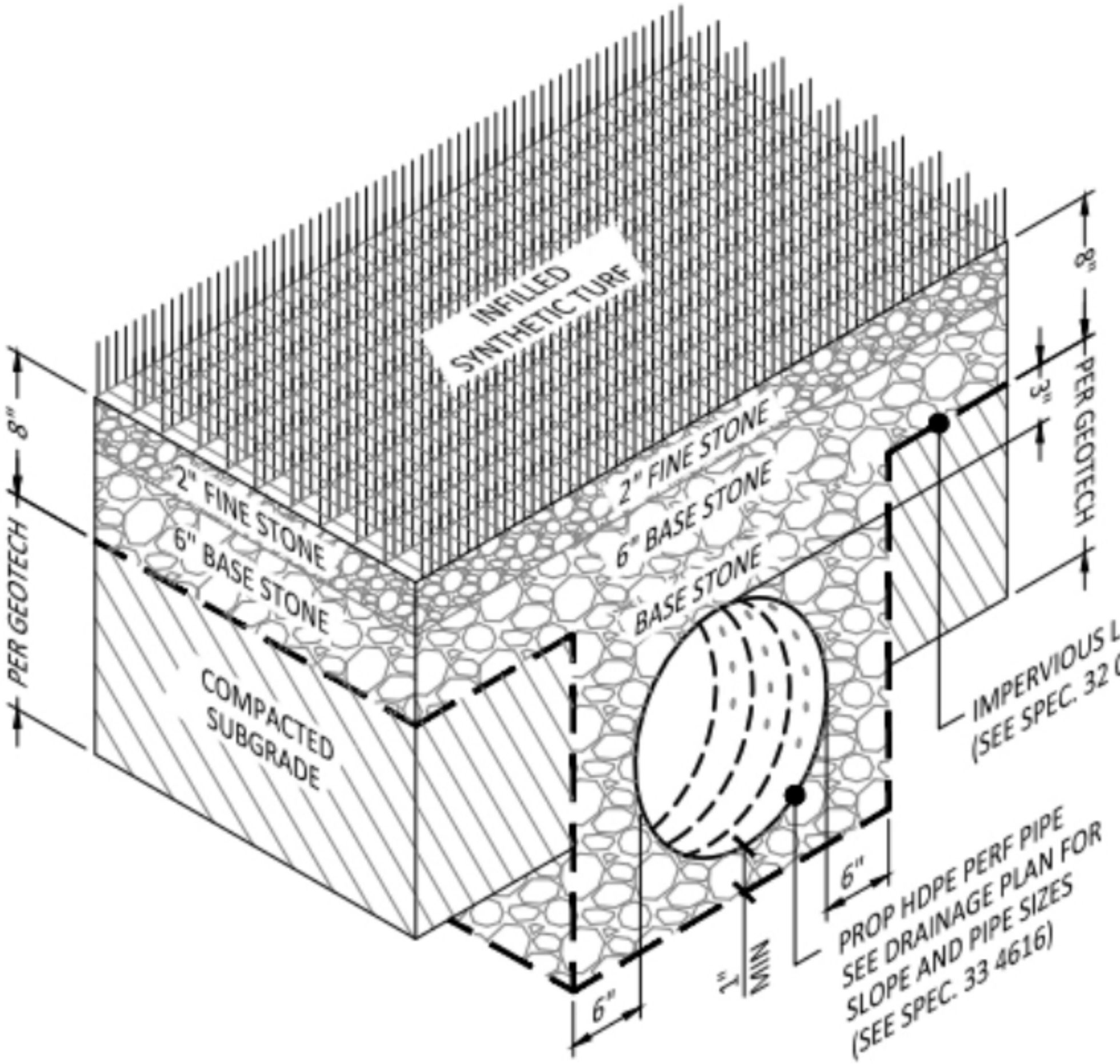
Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Elkins HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-E

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1									1.50
B-1	3	64	29	35	90.2	14				1.50
B-1	5					20	136	2.99		1.50
B-1	7	32	19	13	91.0	11				1.25
B-1	9					14	125	1.44		1.50
B-1	11	39	26	13	96.6	18				1.33
B-1	13									0.75
B-1	15	76	30	46	96.0	31				0.67
B-1	17					30	118		0.48	0.67
B-1	19									0.58
B-1	24					18	126		0.49	0.58
B-2	1					20				1.50
B-2	3	71	24	47	90.1	28				1.17
B-2	5					18	129	3.28		1.50
B-2	7	41	16	25	84.3	19	133	2.00		1.33
B-2	9									1.42
B-3	1	48	20	28		20				1.50
B-3	3									1.50
B-3	5	44	17	27	95.1	20				1.50
B-3	7					11				1.50
B-3	9	45	15	30	95.5	14	134	1.80		1.50
B-4	1	38	17	21	81.1	14	134	2.48		1.50
B-4	3									1.50
B-4	5	38	15	23	83.1	11				1.50
B-4	7					17	137	1.95		1.50
B-4	9	66	22	44	92.5	26				0.75
B-4	11									0.58
B-4	13	68	21	47	97.6	30				0.67
B-4	15					30	129		0.59	0.67
B-4	17	26	15	11	90.1	23				0.42
B-4	19					23	134		0.26	0.33
B-5	1					16				1.50
B-5	3	69	21	48	93.5	21	124	2.96		1.50
B-5	5					15				1.50
B-5	7	31	14	17	97.6	19				1.50
B-5	9									1.50
Total		**16**	**16**	**16**	**15**	**28**	**12**	**8**	**4**	**36**

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APPENDIX C

SYNTHETIC TURF CROSS SECTION



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8 N.T.S.

INFILLED SYNTHETIC TURF TRENCH SECTION

GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Kempner High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

October 09, 2025

REPORT NO. HG1810383.17 –G

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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October 9, 2025

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Kempner High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17-G

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

P. Dahal

Prakash Dahal, PE
Project Engineer



10/09/2025

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on October 9, 2025. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Kempner HS. The improvements at Kempner HS involves construction of a new football concession stand and baseball hitting cage. This also includes construction of dugout, press box, installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the concession stand, press box, dugout and hitting cage was not provided to us at the time of writing this report. However, we anticipate that concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 25 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate the available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 2 miles south of the Renn Scarp fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was encountered at depths varying between 15.3 and 16.5 feet in borings B-1 and B-3 below the existing grade during the drilling operations. The other borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7 feet of soil within the project location are presented in the table below.

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Potential Vertical Rise for the Onsite Soils

Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Concession Stand	B-1	2.17	1.76	1.85
Baseball Dugout & Hitting Cage	B-5	2.47	1.98	2.15
Press Box and Softball & Baseball Dugouts*	B-3	2.19	1.57	2.19
Softball Dugout	B-4 & B-3	2.79	2.00	2.74

Note: '*'- Dugouts located east of boring B-3, along a narrow passage between softball and baseball field.

We anticipate that concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade. The required soil replacement depths for the tolerable PVR limits are provided in table below.

Potential Vertical Rise with Soil Replacement

Structure	Soil replacement Depth below existing grade, Feet
Concession Stand	3
Softball Dugouts	5*
Baseball Dugouts	5*
Press Box	5
Hitting Cage	5

Note: '*'- Softball and baseball dugouts founded at about 3 feet depth below the existing grade will require 2 feet of soil replacement from finished grade with compacted select fill.

The foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

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2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Kempner HS. The improvements at Kempner HS involves construction of a new football concession stand and baseball hitting cage. This also includes construction of dugout, press box, installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 25 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed between November 3th and 8th, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling one (1) boring to a depth of 25 feet for the football concession stand, one (1) boring to a depth of 25 feet for the press box and net poles, one (1) boring to a depth of 20 feet for the dugouts and softball field, one (1) boring to a depth of 15 feet for the hitting cage and one (1) boring to a depth of 10 feet for the baseball field. Borings B-2, B-3, B-4 and B-5 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry and/or wet auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings except for borings B-1 and B-3, where the sampling was performed continuously to 20 feet and at 5 feet interval until the termination depth of 25 feet. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°38'33.0"N	95°38'40.4"W	85.0
B-2	29°38'38.2"N	95°38'30.5"W	85.0
B-3	29°38'35.4"N	95°38'35.1"W	85.0
B-4	29°38'34.0"N	95°38'32.5"W	86.0
B-5	29°39'37.7"N	95°38'35.4"W	85.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

The groundwater level in the borings were measured during drilling operations. Groundwater readings observed in the borings are presented in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

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Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained (UU) Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	37
Atterberg Limits (ASTM D4318)	19
Percent Passing No. 200 Sieve (ASTM D1140)	18
Unconfined Compression (ASTM D2166)	10
Unconsolidated-Undrained (ASTM D2850)	5

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

There are two major surface geological formations that exist in the Gulf area: the Beaumont formation and the Lissie formation. The Beaumont formation is a relatively younger formation generally found to the southeast of the Lissie formation. The Beaumont formation dips southeastward and extends beneath beach sand and waters of the Gulf of Mexico as far as the continental shelf. The project site is located in an area where the Beaumont formation is typically encountered. A geology map is presented on Plate 3.

The Beaumont formation was deposited on land near sea level in flat river deltas and in inter-delta regions. Soil deposition occurred in fresh water streams and in flood plains (as backwater marsh and natural levees). The courses of major streams and deltaic tributaries changed frequently during the period of deposition, generating within the Beaumont clay a complex stratification of sand, silt and clay deposits. Frequently, stream courses were diverted significant distances from a given point in a backwater marsh, and the water overlying the soil would evaporate since it was cut off from a drainage path. Such water, which would be highly alkaline, would precipitate large nodules of calcium carbonate (calcareous nodules) throughout the surface of evaporation. With the coming of the Second Wisconsin Ice Age, the nearby sea withdrew, leaving the formation several hundred feet above sea level and permitting the soil to desiccate. The process of desiccation compressed the clays in the formation such that they became significantly over-consolidated to a large depth. In addition to pre-consolidating the soil, the process of desiccation, together with the later rewetting, produced a

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network of fissures and slickensides that are now closed but which represent potential planes of weakness in the soil.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate the available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 2 miles south of the Renn Scarp fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Groundwater levels in the borings were observed during the drilling operations. Drilling was suspended for 10 minutes, and groundwater levels during drilling and after ten minutes were measured. Table 5-1 summarizes the groundwater level measurements taken at the boring locations.

Table 5-1 – Groundwater Observations

Boring	Depth	Groundwater Depth below Existing Grade, Feet	
		During Drilling	10 Minutes after Drilling
B-1	25	16.5	15.3
B-2	10	Dry	--
B-3	25	15.8	15.6
B-4	20	Dry	--
B-5	15	Dry	--

Note: '--': Not observed.

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It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

6 FOUNDATION RECOMMENDATIONS FOR CONCESSION STAND, PRESS BOX, DUG OUT AND HITTING CAGE STRUCTURES

6.1 General

The project involves construction of a new football concession stand and baseball hitting cage. This also includes construction of a dugout and press box at the softball and baseball fields. Information related to the proposed foundation system to support these structures was not provided to us at the time of writing this report. However, we anticipate that the concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the project location are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Concession Stand	B-1	2.17	1.76	1.85
Baseball Dugout & Hitting Cage	B-5	2.47	1.98	2.15

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Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Press Box and Softball & Baseball Dugouts*	B-3	2.19	1.57	2.19
Softball Dugout	B-4 & B-3	2.79	2.00	2.74

Note: '*'- Dugouts located east of boring B-3, along a narrow passage between softball and baseball field.

6.3 Slab Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

The concession stand, press box and hitting cage structures may be supported on a slab-on-grade foundation system and the dugouts on a concrete slab at about 3 feet below the existing grade provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab. The required soil replacement depths for the tolerable PVR limits are provided in Table 6-2.

Table 6-2– Potential Vertical Rise with Soil Replacement

Structure	Soil replacement Depth below existing grade, Feet
Concession Stand	3
Softball Dugouts	5*
Baseball Dugouts	5*
Press Box	5
Hitting Cage	5

Note: '*'- Softball and baseball dugouts founded at about 3 feet depth below the existing grade will require 2 feet of soil replacement from finished grade with compacted select fill.

For concession stand, press box and hitting cage structures, in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 3-foot, 5-foot and 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill, respectively. This may be achieved by replacing the top 3 feet of on-site soils for concession stand and top 5 feet for press box and hitting cage with select compacted fill. Similarly, for softball and baseball dugouts we recommend excavating top 5 feet of soil, replacing 2 feet with select compacted fill and placing the foundation slab on the top of fill.

We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical

professionals to identify any soft or weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended.

6.4 Lateral Pressures for Softball and Baseball Dugouts

The pressures which a soil can be expected to exert on the exterior walls of the structure that depend on the type of soil and the construction technique. If the construction method encompasses backfilling along the exterior walls of the structure, then the lateral earth pressures become a function of the type of backfill and its method of placement. Here, the lateral earth pressures exerted on the wall are mainly a function of the subgrade soils. The at-rest, active and passive earth pressure coefficients are summarized below.

Table 6-3 – Design Lateral Earth Pressure Parameters

Fill Type	Effective Unit Weight (γ')pcf	Friction Angle (ϕ)^o	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Coefficient of Earth Pressure at Rest (K_0)
Onsite Cohesive Soil	63	21	0.47	2.12	1.05

The lateral earth pressure coefficients provided on the table above were determined based on a horizontal surface at the top of the wall. Active earth pressures will only be achieved if sufficient lateral deflection of the wall is allowed to occur. If the wall deflection is limited, the wall should be designed for at rest earth pressures. Groundwater should be assumed at the ground surface.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS

7.1 General

We understand that the proposed improvements at Kempner High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field to support the netting. Also, this involves replacement of synthetic turf at softball and baseball fields.

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7.2 Softball and Baseball Netting Poles

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to rpesist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation. For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.19 for baseball net poles and 0.22 for softball net poles. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 98 pcf for baseball net poles and 105 pcf for softball net poles for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 6 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-2, B-3 & B-7	7-8	Stiff Clay	2,200
Softball Pole	B-3 & B-4	6-8	Stiff Clay	2,200

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 6 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Based on the cross section provided by Texas Sports and Civil Engineering, the synthetic turf will be installed over 2 inches of fine stone, underlain by 6 inches of base stone and compacted subgrade. The provided cross section is included in Appendix C. At the request of Texas Sports & Civil Engineering and pfluger, we have presented below the PVR values for three conditions: (1) without lime treatment of the subgrade, (2) with lime treatment of subgrade to a depth of 8 inches and, (3) lime treatment of subgrade to a depth of 16 inches below 8 inches stone.

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Table 7-2 – PVR for Synthetic Turf

Location	Borings Used	PVR (inches)		
		No Treatment [1]	8" pavement+ 8" Lime Treated[2]	8" pavement+ 16" Lime Treated[3]
Baseball	B-2/B-5	3.58	3.20	2.49
Softball	B-3/B-4	2.79	2.47	1.87

Note:

1. **No Treatment:** Turf + 2" Fine Stone + 6" Base Stone with no lime treatment. In this case, 8" of soil will be excavated and replaced with stone.
2. **8" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 8". Here, 16" of soil will be excavated; the bottom 8" will be treated with lime, backfilled, compacted, and then overlaid with 8" of stone.
3. **16" Lime Treatment:** Turf + 2" Fine Stone + 6" Base Stone with lime treatment to a depth of 16". In this case, 24" of soil will be excavated; the bottom 16" will be treated with lime, backfilled, compacted, and overlaid with 8" of stone.

We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section 7.4 for the subgrade preparation recommendations. The depth of subgrade treatment for synthetic turf will vary depending upon the PVR based on the table above.

7.4 Preparation of Subgrade

The subgrade soils for the fields will consist of stiff to hard Fat Clay (CH) and Lean Clay (CL). We recommend that at least eight inches of the subgrade be stabilized with 6% of lime for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by

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conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications. Subgrade stabilization/treatment should extend a minimum of two feet beyond the edge of the proposed fields.

8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

10 DESIGN REVIEW

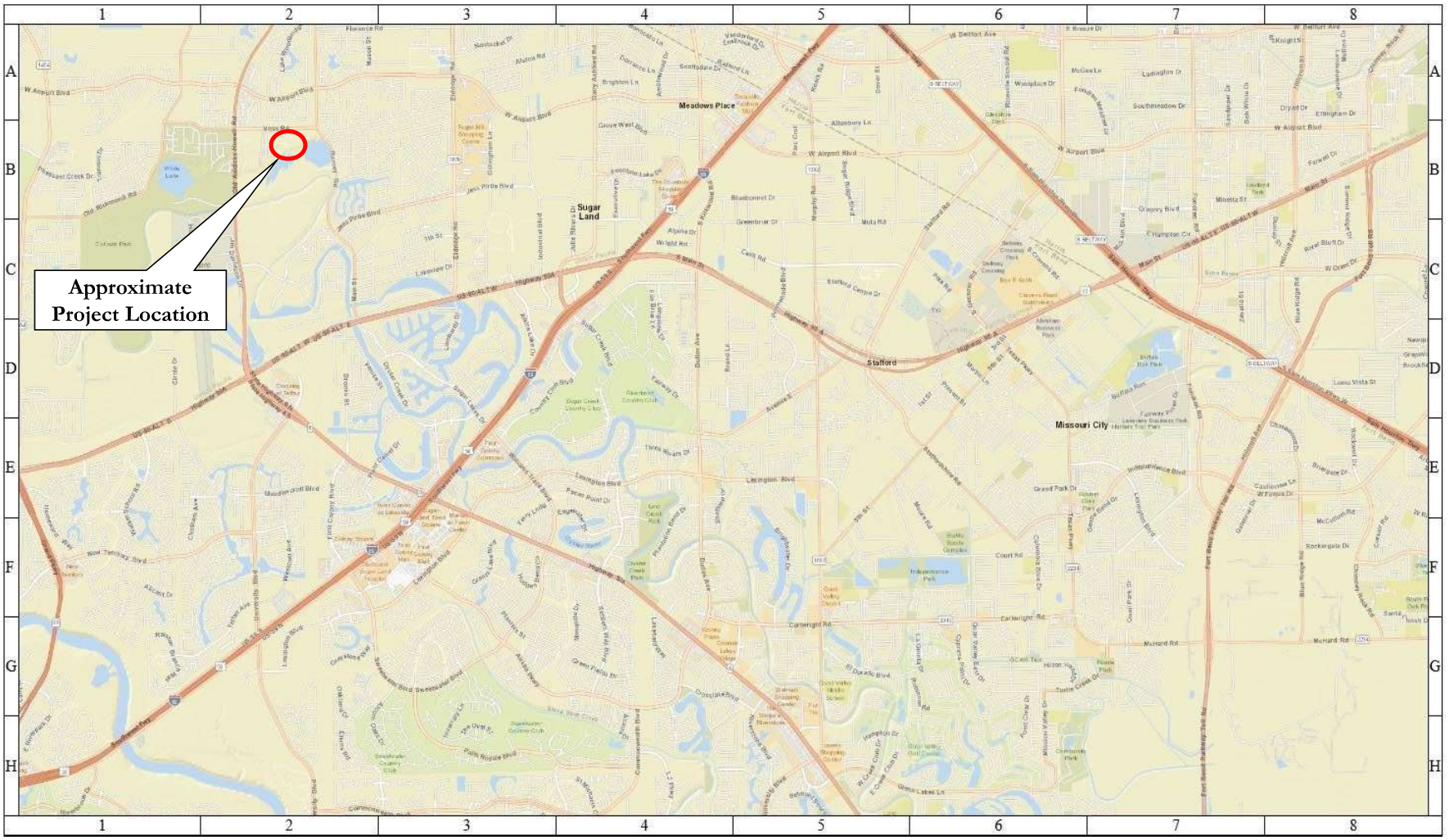
HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Kempner High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

PLATES



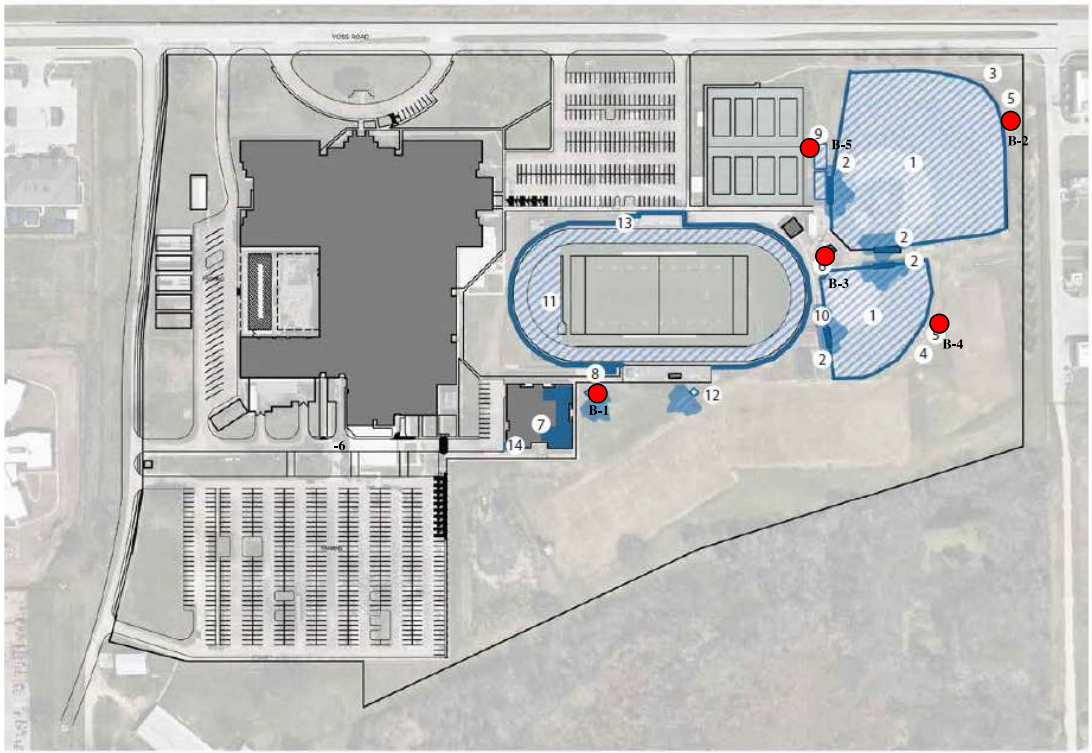
HVJ ASSOCIATES
6120 S. Dairy Ashford Road
Houston, Texas 77072-1010
281.933.7388 Ph
281.933.7293 Fax

DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- G	PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. New Press Box
7. Locker Room - Renovations
8. New Concession
9. Hitting cage New Turf
10. Equipment storage Softball
11. Resurface Track
12. Discus Cage
13. New Fence and gate
14. Replace Washer/ Dryer



SECONDARY SUPPORT WORK
EXISTING BUILDINGS
NEW WORK
PRIMARY SITE WORK

0 50' 100' 150' 250' 450'
GRAPHIC BARSCALE

SITE PLAN NEW
SCALE : 1/128" = 1'-0"

N

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KEMPNER HIGH SCHOOL
11111 Harlem Rd, Richmond, TX 77406

FBISD
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16431 Lexington Blvd.
Sugar Land, TX 77479

Sheet No:6

LEGEND:

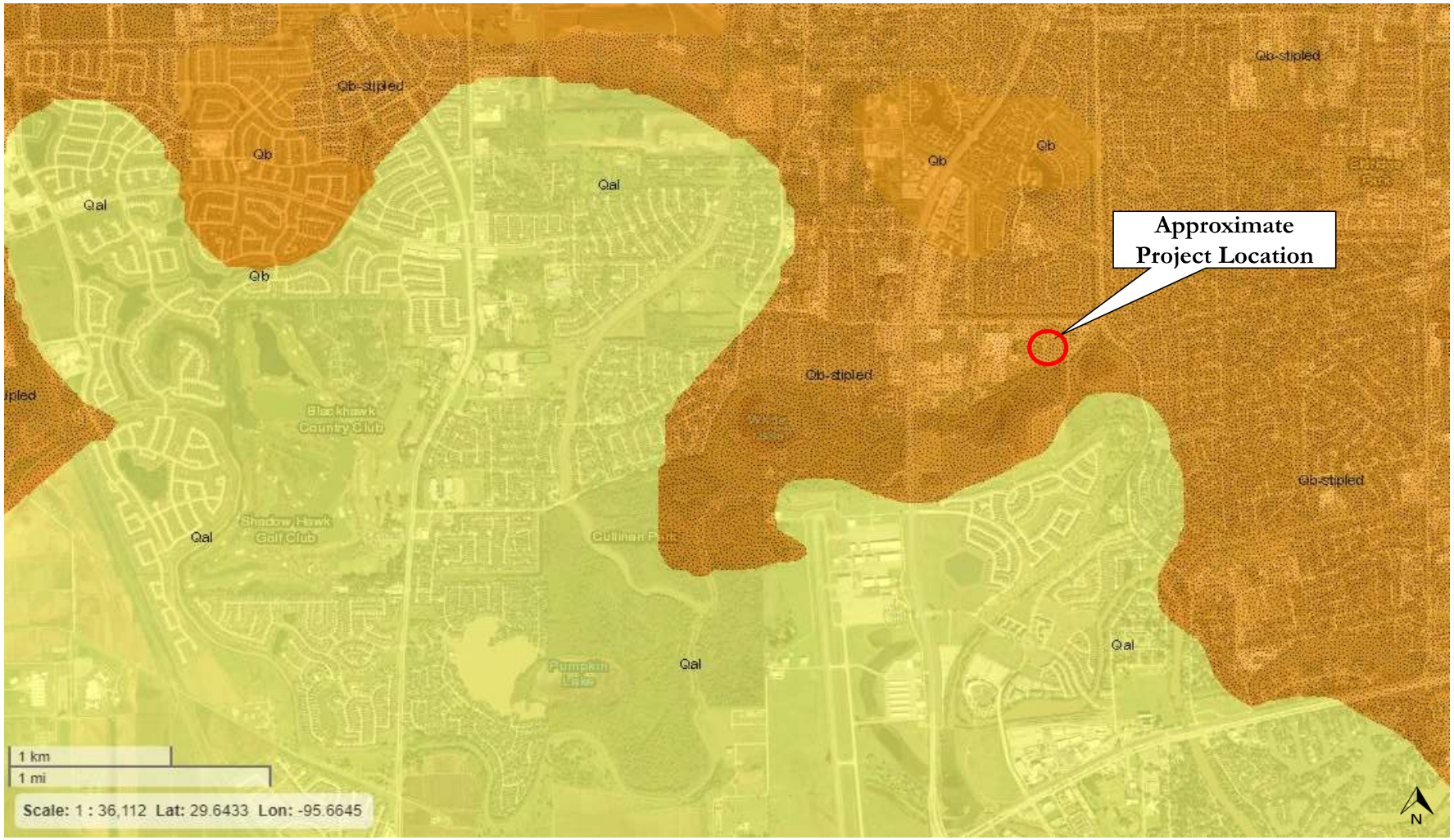
APPROXIMATE BORING LOCATIONS

HVJ ASSOCIATES
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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17-G	PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qb
Qb-stipled

Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

Qal

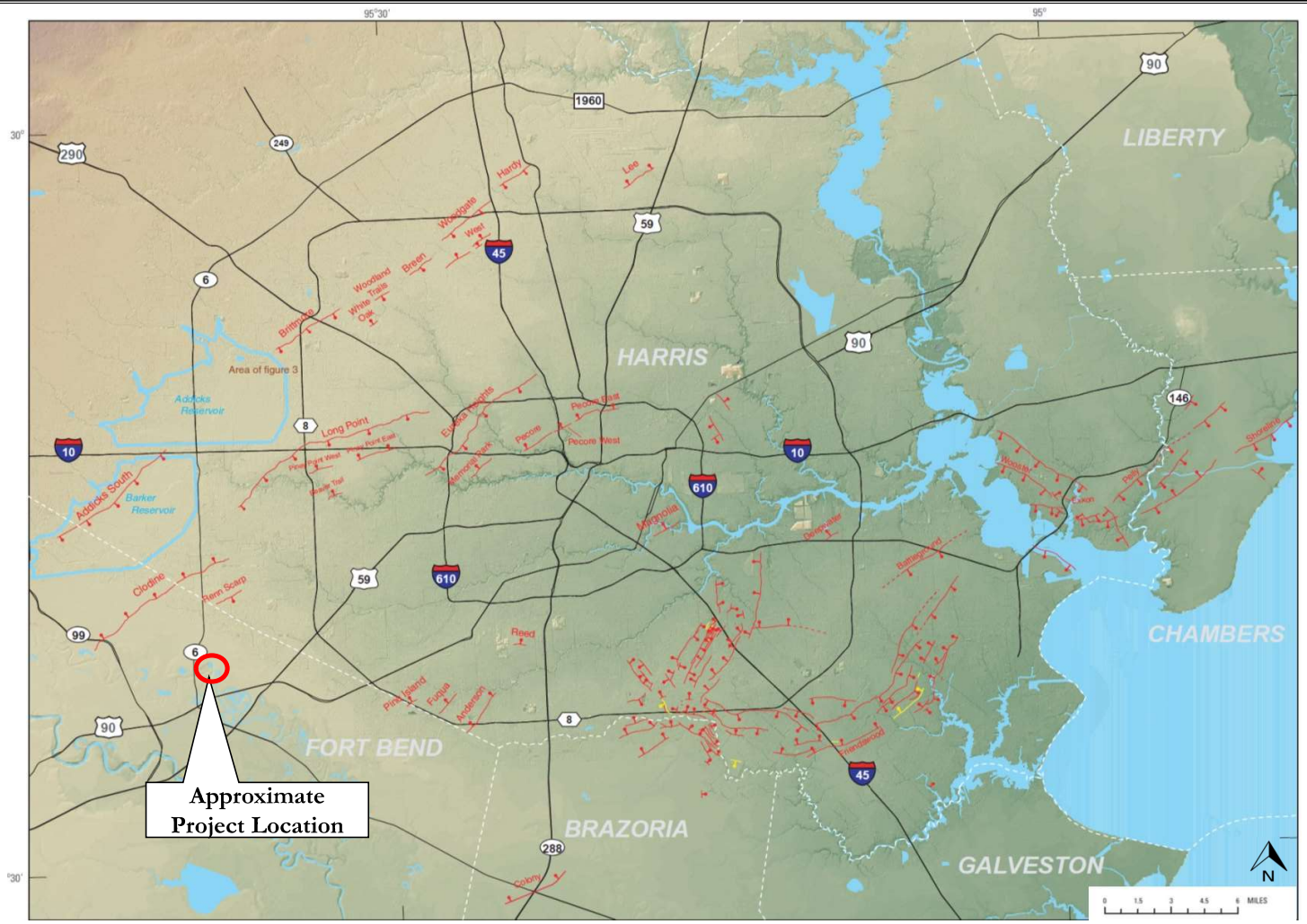
Alluvium (Qal) – Floodplain deposits, including low terrace deposits 3-8 feet above floodplain subject to flooding; clay, silt, sand and organic matter; silt and clay, calcareous, dark gray to dark brown; sand largely quarts; gravel siliceous, mostly chert, quartzite, and petrified wood, along Colorado River much limestone.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.: HG1810383.17-	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- G	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'33.0"N; 95°38'40.4"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 25 FT
CAVE-IN DEPTH: 18 FT
DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 18 FT
WET ROTARY: 18 TO 25 FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'-6'		85.9		12	52	16	36
80	5				96	36			
		Very stiff, brown, LEAN CLAY WITH SAND (CL) - with calcareous nodules and ferrous stains at 6'-10'		83.8		15	38	14	24
	10				110	18			
75		Stiff to very stiff, brown, SANDY LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 10'-14'		67.1		16	32	15	17
	15	Stiff to very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 14'-25'		87.5		19	43	20	23
70					131	19			
65	20								
					108	20			
60	25								

3.11

COH HG1810383.17 (KEMPNER HS).GPJ 12/14/23

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: 16.5 FT; AFTER 10 MIN. AT 15.3 FT
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'38.2"N; 95°38'30.5"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 10 FT

DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0			Very stiff to hard, dark brown and brown, FAT CLAY (CH) - with roots at 0'-4'				17			
						93.6		20	72	20	52
				- with calcareous nodules at 4'-10'							
80	5						102	21			
				- with ferrous stains at 6'-10'							
						94.7	112	17	56	17	39
75	10										

3.09

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-3

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'35.4"N; 95°38'35.1"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 25 FT
CAVE-IN DEPTH: 16 FT
DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 16 FT
WET ROTARY: 16 TO 25 FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots and calcareous nodules at 0'-6'				15	55	21	34
					114	11			
80	5			87.0		15	54	22	32
		Firm to hard, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'-14'			113	16			
				94.2		16	45	12	33
75	10								
				85.9		17	43	18	25
70 ▽	15				109	20			
		- with calcareous nodules at 16'-18'		95.2		20	33	18	15
		- with sand seams below 18'				15			
65	20								
			13			16			
60	25								

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

3.52
3.57

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: 15.8 FT; AFTER 10 MIN. AT 15.6 FT
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'34.0"N; 95°38'32.5"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 86.0 FT

COMPLETION DEPTH: 20 FT

DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'-4'		88.2		14	59	16	43
	5				116	15			
80		Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'-10'		86.8		19	40	14	26
	10				114	16			
75		Stiff to very stiff, brown, SANDY LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 10'-14'		67.7		14	29	12	17
	15	- with calcareous nodules at 14'-20'		69.2		18	25	12	13
70					100	26			
	20				108	21			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

4.09

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

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LOG OF BORING B-5

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°39'37.7"N; 95°38'35.4"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 15 FT

DATE: 11/8/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 15 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Stiff, dark gray, LEAN CLAY (CL)		85.2		22	40	14	26
		Stiff to very stiff, dark gray and gray, FAT CLAY (CH)			103	21			
80	5			88.2		21	57	15	42
					100	19			
		Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 8'-15'		91.3		18	41	14	27
75	10								
				92.2		19	42	15	27
70	15					15			

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

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SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

KEMPNER HS

PROJECT NO.: HG1810383.17-G

DRAWING NO.: PLATE A-6

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APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Kempner HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-G

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1									1.50
B-1	3	52	16	36	85.9	12				1.50
B-1	5					36	131	3.41		1.50
B-1	7	38	14	24	83.8	15				1.50
B-1	9					18	130	1.84		1.50
B-1	11	32	15	17	67.1	16				0.92
B-1	13									1.08
B-1	15	43	20	23	87.5	19				1.08
B-1	17					19	156		1.24	1.08
B-1	19									0.67
B-1	24					20	130		1.45	1.33
B-2	1					17				1.50
B-2	3	72	20	52	93.6	20				1.50
B-2	5					21	123	3.09		1.50
B-2	7	56	17	39	94.7	17	131	2.78		1.50
B-2	9									1.33
B-3	1	55	21	34		15				1.50
B-3	3					11	127	3.52		1.50
B-3	5	54	22	32	87.0	15				1.50
B-3	7					16	131	3.57		1.50
B-3	9	45	12	33	94.2	16				1.50
B-3	11									0.83
B-3	13	43	18	25	85.9	17				1.50
B-3	15					20	131		0.87	0.75
B-3	17	33	18	15	95.2	20				0.58
B-3	19					15				0.33
B-3	24					16				
B-4	1									1.50
B-4	3	59	16	43	88.2	14				1.50
B-4	5					15	133	4.09		1.50
B-4	7	40	14	26	86.8	19				1.17
B-4	9					16	132	1.20		1.25
B-4	11	29	12	17	67.7	14				1.33
B-4	13									0.92
B-4	15	25	12	13	69.2	18				0.67
B-4	17					26	126		0.83	0.75
B-4	19					21	131		0.67	0.67
B-5	1	40	14	26	85.2	22				0.58
B-5	3					21	125	0.80		1.08

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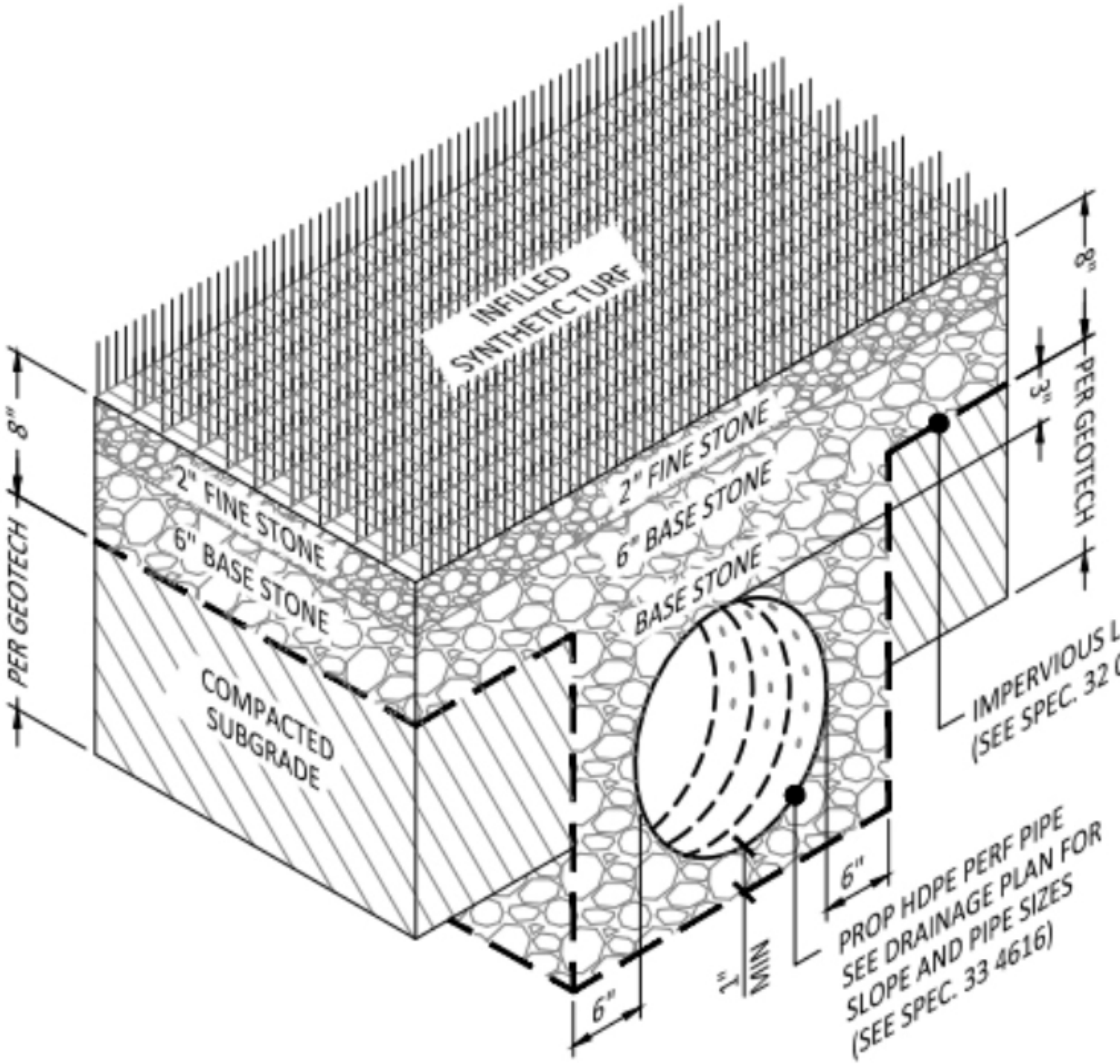
Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Kempner HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-G

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-5	5	57	15	42	88.2	21				1.42
B-5	7					19	119	0.91		0.75
B-5	9	41	14	27	91.3	18				1.25
B-5	11									1.50
B-5	13	42	15	27	92.2	19				1.33
B-5	14.5					15				1.33
Total		**19**	**19**	**19**	**18**	**37**	**15**	**10**	**5**	**44**

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APPENDIX C

SYNTHETIC TURF CROSS SECTION



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8 N.T.S.

INFILLED SYNTHETIC TURF TRENCH SECTION

GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Kempner High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

February 09, 2024

REPORT NO. HG1810383.17 –G

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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February 9, 2024

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Kempner High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17-G

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

P. Dahal

Prakash Dahal, PE
Project Engineer



02/09/2024

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on February 9, 2024. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Kempner HS. The improvements at Kempner HS involves construction of a new football concession stand and baseball hitting cage. This also includes construction of dugout, press box, installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the concession stand, press box, dugout and hitting cage was not provided to us at the time of writing this report. However, we anticipate that concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 25 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate the available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 2 miles south of the Renn Scarp fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was encountered at depths varying between 15.3 and 16.5 feet in borings B-1 and B-3 below the existing grade during the drilling operations. The other borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7 feet of soil within the project location are presented in the table below.

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Potential Vertical Rise for the Onsite Soils

Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Concession Stand	B-1	2.17	1.76	1.85
Baseball Dugout & Hitting Cage	B-5	2.47	1.98	2.15
Press Box and Softball & Baseball Dugouts*	B-3	2.19	1.57	2.19
Softball Dugout	B-4 & B-3	2.79	2.00	2.74

Note: '*'- Dugouts located east of boring B-3, along a narrow passage between softball and baseball field.

We anticipate that concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade. The required soil replacement depths for the tolerable PVR limits are provided in table below.

Potential Vertical Rise with Soil Replacement

Structure	Soil replacement Depth below existing grade, Feet
Concession Stand	3
Softball Dugouts	5*
Baseball Dugouts	5*
Press Box	5
Hitting Cage	5

Note: '*'- Softball and baseball dugouts founded at about 3 feet depth below the existing grade will require 2 feet of soil replacement from finished grade with compacted select fill.

The foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

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2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Kempner HS. The improvements at Kempner HS involves construction of a new football concession stand and baseball hitting cage. This also includes construction of dugout, press box, installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 25 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed between November 3th and 8th, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling one (1) boring to a depth of 25 feet for the football concession stand, one (1) boring to a depth of 25 feet for the press box and net poles, one (1) boring to a depth of 20 feet for the dugouts and softball field, one (1) boring to a depth of 15 feet for the hitting cage and one (1) boring to a depth of 10 feet for the baseball field. Borings B-2, B-3, B-4 and B-5 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry and/or wet auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings except for borings B-1 and B-3, where the sampling was performed continuously to 20 feet and at 5 feet interval until the termination depth of 25 feet. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°38'33.0"N	95°38'40.4"W	85.0
B-2	29°38'38.2"N	95°38'30.5"W	85.0
B-3	29°38'35.4"N	95°38'35.1"W	85.0
B-4	29°38'34.0"N	95°38'32.5"W	86.0
B-5	29°39'37.7"N	95°38'35.4"W	85.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

The groundwater level in the borings were measured during drilling operations. Groundwater readings observed in the borings are presented in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

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Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained (UU) Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	37
Atterberg Limits (ASTM D4318)	19
Percent Passing No. 200 Sieve (ASTM D1140)	18
Unconfined Compression (ASTM D2166)	10
Unconsolidated-Undrained (ASTM D2850)	5

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

There are two major surface geological formations that exist in the Gulf area: the Beaumont formation and the Lissie formation. The Beaumont formation is a relatively younger formation generally found to the southeast of the Lissie formation. The Beaumont formation dips southeastward and extends beneath beach sand and waters of the Gulf of Mexico as far as the continental shelf. The project site is located in an area where the Beaumont formation is typically encountered. A geology map is presented on Plate 3.

The Beaumont formation was deposited on land near sea level in flat river deltas and in inter-delta regions. Soil deposition occurred in fresh water streams and in flood plains (as backwater marsh and natural levees). The courses of major streams and deltaic tributaries changed frequently during the period of deposition, generating within the Beaumont clay a complex stratification of sand, silt and clay deposits. Frequently, stream courses were diverted significant distances from a given point in a backwater marsh, and the water overlying the soil would evaporate since it was cut off from a drainage path. Such water, which would be highly alkaline, would precipitate large nodules of calcium carbonate (calcareous nodules) throughout the surface of evaporation. With the coming of the Second Wisconsin Ice Age, the nearby sea withdrew, leaving the formation several hundred feet above sea level and permitting the soil to desiccate. The process of desiccation compressed the clays in the formation such that they became significantly over-consolidated to a large depth. In addition to pre-consolidating the soil, the process of desiccation, together with the later rewetting, produced a

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network of fissures and slickensides that are now closed but which represent potential planes of weakness in the soil.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review was conducted to identify the documented faults in the project area. The primary objective of this review was to evaluate the available information from published and open file reports. Based on Sachin D. Shah and Jennifer Lanning-Rush, 2005, the project site is situated approximately 2 miles south of the Renn Scarp fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were encountered below the existing grade until the termination depth of borings. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Groundwater levels in the borings were observed during the drilling operations. Drilling was suspended for 10 minutes, and groundwater levels during drilling and after ten minutes were measured. Table 5-1 summarizes the groundwater level measurements taken at the boring locations.

Table 5-1 – Groundwater Observations

Boring	Depth	Groundwater Depth below Existing Grade, Feet	
		During Drilling	10 Minutes after Drilling
B-1	25	16.5	15.3
B-2	10	Dry	--
B-3	25	15.8	15.6
B-4	20	Dry	--
B-5	15	Dry	--

Note: '--': Not observed.

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It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

6 FOUNDATION RECOMMENDATIONS FOR CONCESSION STAND, PRESS BOX, DUG OUT AND HITTING CAGE STRUCTURES

6.1 General

The project involves construction of a new football concession stand and baseball hitting cage. This also includes construction of a dugout and press box at the softball and baseball fields. Information related to the proposed foundation system to support these structures was not provided to us at the time of writing this report. However, we anticipate that the concession stand, press box and hitting cage will be supported by a shallow foundation consisting of a slab-on-grade foundation system and the dugouts will be supported on a concrete slab at about 3 feet below the existing grade. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the project location are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Concession Stand	B-1	2.17	1.76	1.85
Baseball Dugout & Hitting Cage	B-5	2.47	1.98	2.15

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Structures	Boring	PVR (inches)		
		Dry	Average	Existing
Press Box and Softball & Baseball Dugouts*	B-3	2.19	1.57	2.19
Softball Dugout	B-4 & B-3	2.79	2.00	2.74

Note: '*'- Dugouts located east of boring B-3, along a narrow passage between softball and baseball field.

6.3 Slab Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

The concession stand, press box and hitting cage structures may be supported on a slab-on-grade foundation system and the dugouts on a concrete slab at about 3 feet below the existing grade provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab. The required soil replacement depths for the tolerable PVR limits are provided in Table 6-2.

Table 6-2– Potential Vertical Rise with Soil Replacement

Structure	Soil replacement Depth below existing grade, Feet
Concession Stand	3
Softball Dugouts	5*
Baseball Dugouts	5*
Press Box	5
Hitting Cage	5

Note: '*'- Softball and baseball dugouts founded at about 3 feet depth below the existing grade will require 2 feet of soil replacement from finished grade with compacted select fill.

For concession stand, press box and hitting cage structures, in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 3-foot, 5-foot and 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill, respectively. This may be achieved by replacing the top 3 feet of on-site soils for concession stand and top 5 feet for press box and hitting cage with select compacted fill. Similarly, for softball and baseball dugouts we recommend excavating top 5 feet of soil, replacing 2 feet with select compacted fill and placing the foundation slab on the top of fill.

We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical

professionals to identify any soft or weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended.

6.4 Lateral Pressures for Softball and Baseball Dugouts

The pressures which a soil can be expected to exert on the exterior walls of the structure that depend on the type of soil and the construction technique. If the construction method encompasses backfilling along the exterior walls of the structure, then the lateral earth pressures become a function of the type of backfill and its method of placement. Here, the lateral earth pressures exerted on the wall are mainly a function of the subgrade soils. The at-rest, active and passive earth pressure coefficients are summarized below.

Table 6-3 – Design Lateral Earth Pressure Parameters

Fill Type	Effective Unit Weight (γ')pcf	Friction Angle (ϕ)^o	Coefficient of Active Earth Pressure (K_a)	Coefficient of Passive Earth Pressure (K_p)	Coefficient of Earth Pressure at Rest (K_0)
Onsite Cohesive Soil	63	21	0.47	2.12	1.05

The lateral earth pressure coefficients provided on the table above were determined based on a horizontal surface at the top of the wall. Active earth pressures will only be achieved if sufficient lateral deflection of the wall is allowed to occur. If the wall deflection is limited, the wall should be designed for at rest earth pressures. Groundwater should be assumed at the ground surface.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS

7.1 General

We understand that the proposed improvements at Kempner High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field to support the netting. Also, this involves replacement of synthetic turf at softball and baseball fields.

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7.2 Softball and Baseball Netting Poles

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to resist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation. For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.19 for baseball net poles and 0.22 for softball net poles. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 98 pcf for baseball net poles and 105 pcf for softball net poles for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 6 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-2, B-3 & B-7	7-8	Stiff Clay	2,200
Softball Pole	B-3 & B-4	6-8	Stiff Clay	2,200

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 6 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Details of the replacement are not available at the time of writing this report. We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section below for the subgrade preparation recommendations.

7.4 Preparation of Subgrade

The subgrade soils for the fields will consist of stiff to hard Fat Clay (CH) and Lean Clay (CL). We recommend that at least eight inches of the subgrade be stabilized with 6% of lime for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and

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provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications.

8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

10 DESIGN REVIEW

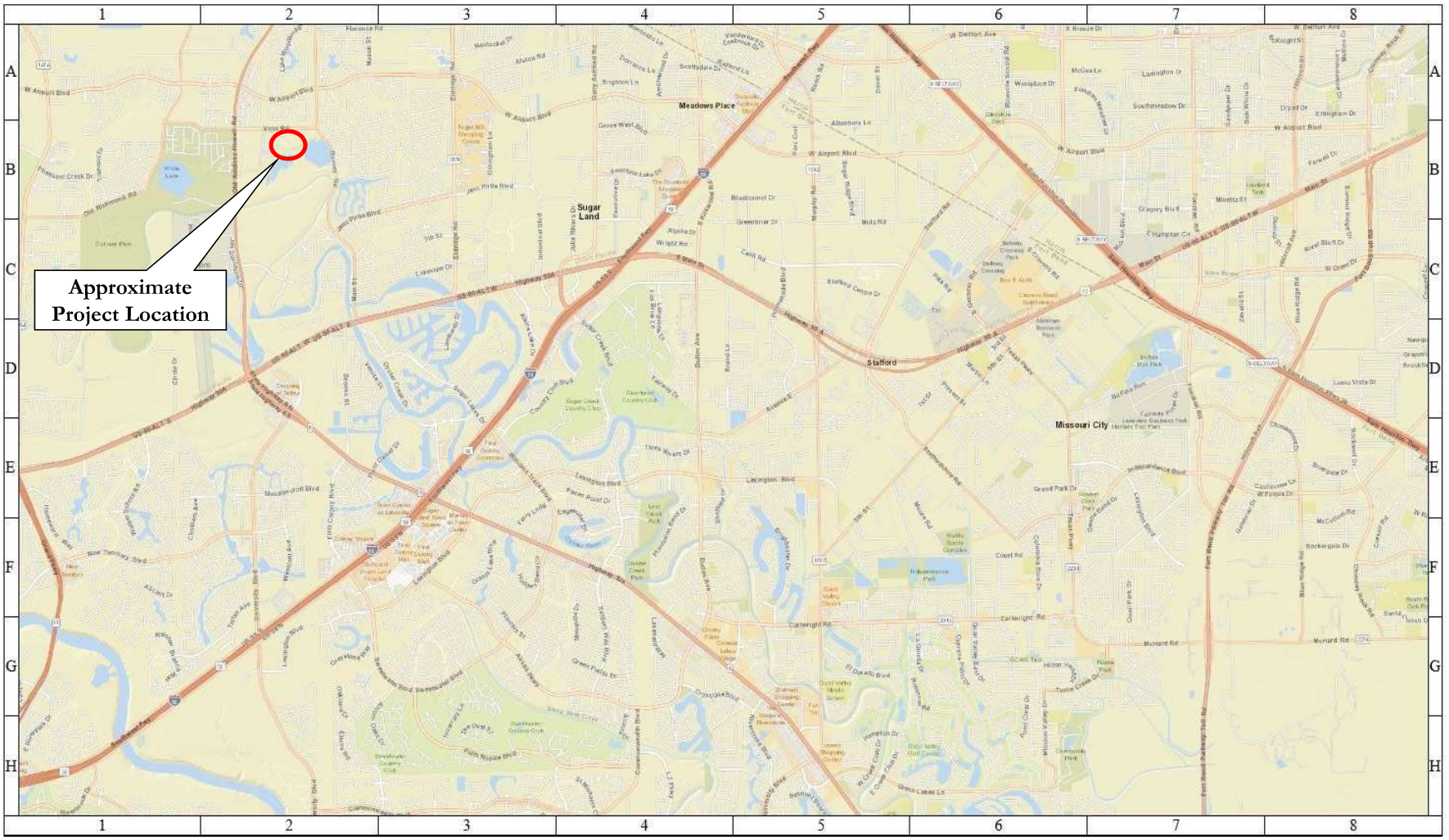
HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Kempner High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

PLATES



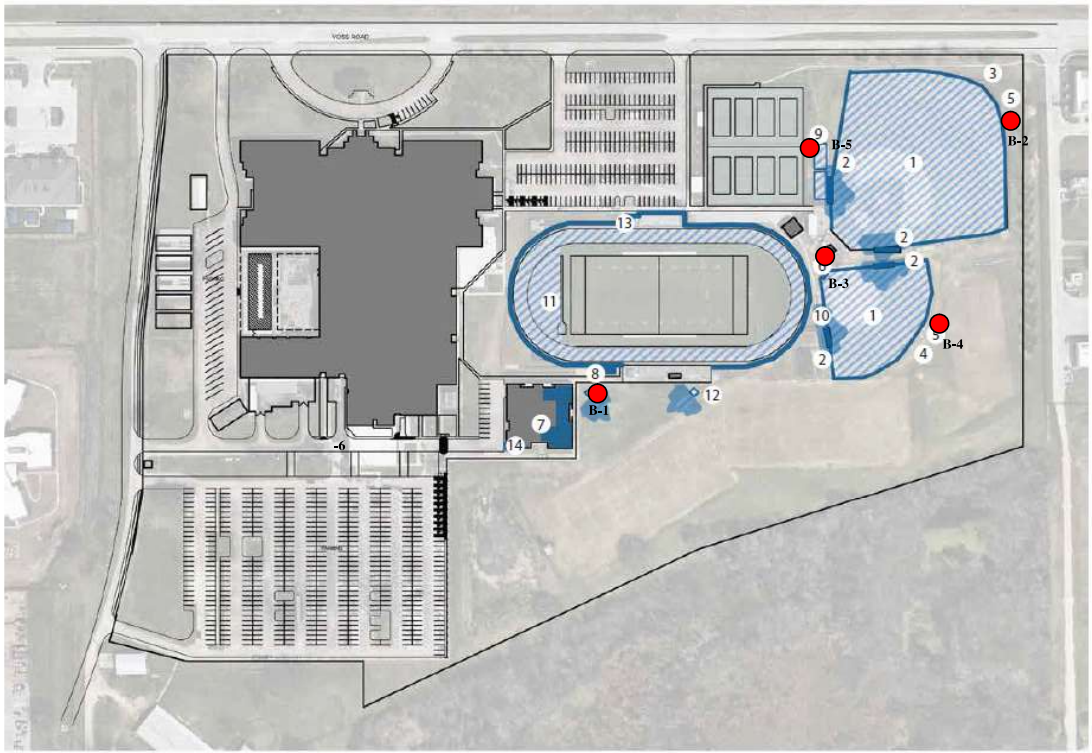
HVJ ASSOCIATES
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Houston, Texas 77072-1010
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281.933.7293 Fax

DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- G	PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. New Press Box
7. Locker Room - Renovations
8. New Concession
9. Hitting cage New Turf
10. Equipment storage Softball
11. Resurface Track
12. Discus Cage
13. New Fence and gate
14. Replace Washer/ Dryer



SECONDARY SUPPORT WORK
EXISTING BUILDINGS
NEW WORK
PRIMARY SITE WORK

0 50' 100' 150' 250' 450'
GRAPHIC BARSCALE

SITE PLAN NEW
SCALE : 1/128" = 1'-0"

N

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16431 Lexington Blvd.
Sugar Land, TX 77479

Sheet No:6

LEGEND:

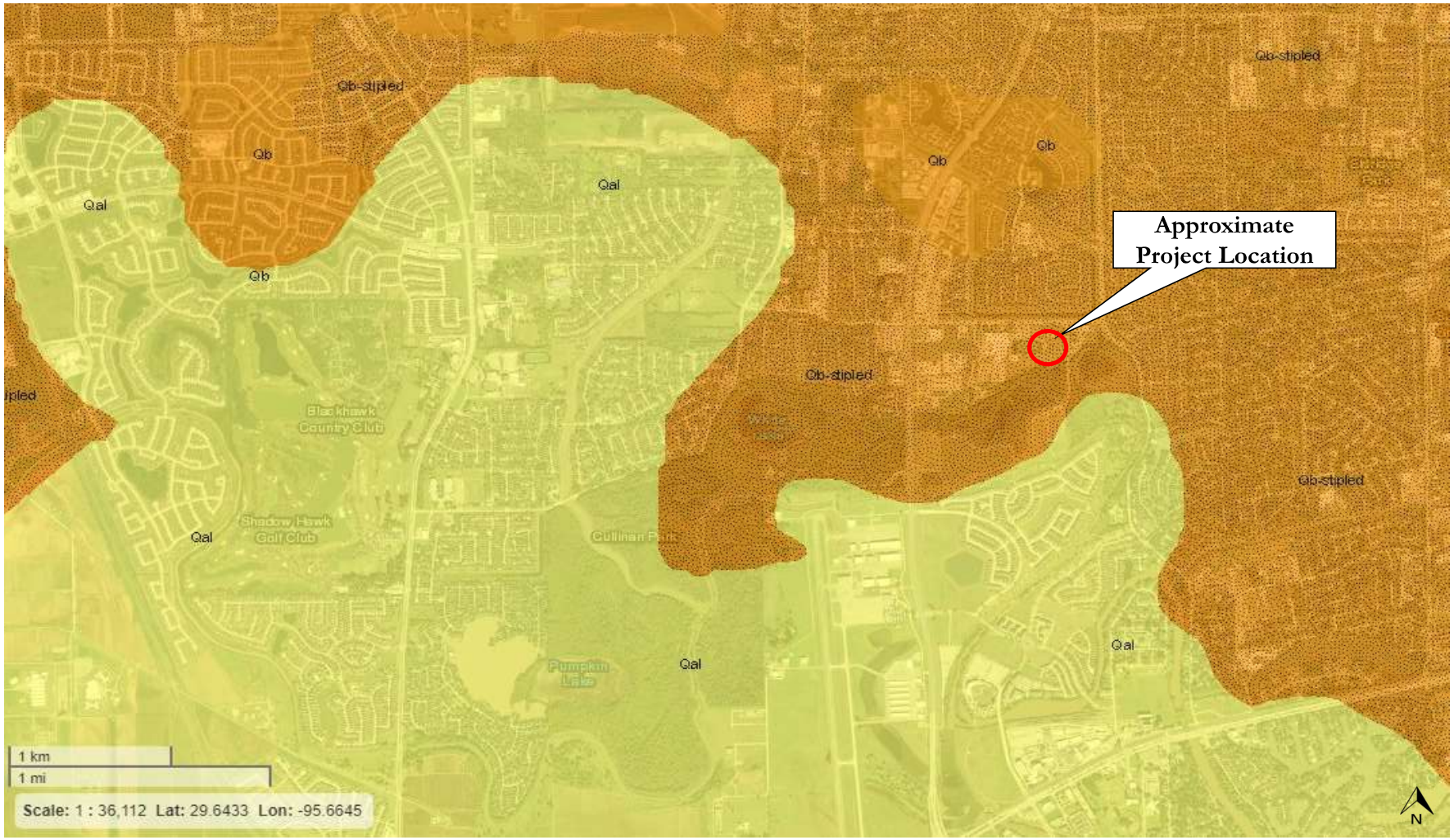
APPROXIMATE BORING LOCATIONS

HVJ ASSOCIATES
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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17-G	PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qb
Qb-stipled

Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

Qal

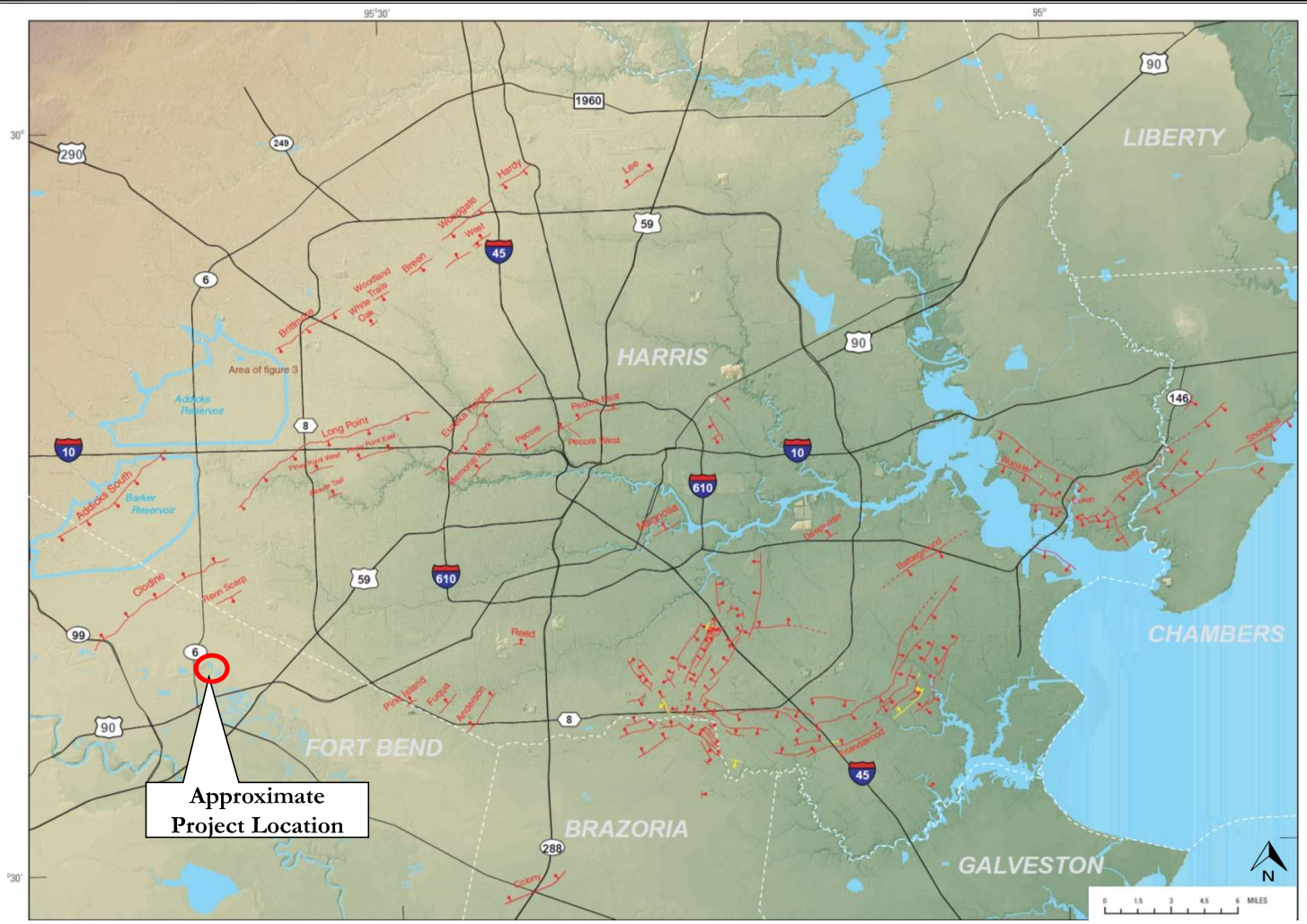
Alluvium (Qal) – Floodplain deposits, including low terrace deposits 3-8 feet above floodplain subject to flooding; clay, silt, sand and organic matter; silt and clay, calcareous, dark gray to dark brown; sand largely quarts; gravel siliceous, mostly chert, quartzite, and petrified wood, along Colorado River much limestone.

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GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.: HG1810383.17-	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (KEMPNER HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- G	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'33.0"N; 95°38'40.4"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 25 FT
CAVE-IN DEPTH: 18 FT
DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 18 FT
WET ROTARY: 18 TO 25 FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'-6'		85.9		12	52	16	36
80	5				96	36			
		Very stiff, brown, LEAN CLAY WITH SAND (CL) - with calcareous nodules and ferrous stains at 6'-10'		83.8		15	38	14	24
	10				110	18			
75		Stiff to very stiff, brown, SANDY LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 10'-14'		67.1		16	32	15	17
	15	Stiff to very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 14'-25'		87.5		19	43	20	23
70					131	19			
65	20								
					108	20			
60	25								

3.11

COH HG1810383.17 (KEMPNER HS).GPJ 12/14/23

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: 16.5 FT; AFTER 10 MIN. AT 15.3 FT
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'38.2"N; 95°38'30.5"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 10 FT

DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0			Very stiff to hard, dark brown and brown, FAT CLAY (CH) - with roots at 0'-4'				17			
						93.6		20	72	20	52
				- with calcareous nodules at 4'-10'							
80	5						102	21			
				- with ferrous stains at 6'-10'							
						94.7	112	17	56	17	39
75	10										

3.09

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-3

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'35.4"N; 95°38'35.1"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 25 FT
CAVE-IN DEPTH: 16 FT
DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 16 FT
WET ROTARY: 16 TO 25 FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots and calcareous nodules at 0'-6'				15	55	21	34
					114	11			
80	5			87.0		15	54	22	32
		Firm to hard, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'-14'			113	16			
				94.2		16	45	12	33
75	10								
				85.9		17	43	18	25
70 ▽	15				109	20			
		- with calcareous nodules at 16'-18'		95.2		20	33	18	15
		- with sand seams below 18'				15			
65	20								
			13			16			
60	25								

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

3.52
3.57

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: 15.8 FT; AFTER 10 MIN. AT 15.6 FT
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°38'34.0"N; 95°38'32.5"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 86.0 FT

COMPLETION DEPTH: 20 FT

DATE: 11/3/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Very stiff to hard, dark brown, FAT CLAY (CH) - with roots at 0'-4'		88.2		14	59	16	43
	5				116	15			
80		Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 6'-10'		86.8		19	40	14	26
	10				114	16			
75		Stiff to very stiff, brown, SANDY LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 10'-14'		67.7		14	29	12	17
	15	- with calcareous nodules at 14'-20'		69.2		18	25	12	13
70					100	26			
	20				108	21			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

4.09

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-5

PROJECT: FBISD School Improvements- Turf & Athletics (Kempner HS) PROJECT NO.: HG1810383.17- G
LOCATION: 29°39'37.7"N; 95°38'35.4"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 85.0 FT

COMPLETION DEPTH: 15 FT

DATE: 11/8/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 15 FT
WET ROTARY: N/A TO N/A FT

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
85	0	Stiff, dark gray, LEAN CLAY (CL)		85.2		22	40	14	26
		Stiff to very stiff, dark gray and gray, FAT CLAY (CH)			103	21			
80	5			88.2		21	57	15	42
					100	19			
		Very stiff, brown, LEAN CLAY (CL) - with calcareous nodules and ferrous stains at 8'-15'		91.3		18	41	14	27
75	10								
				92.2		19	42	15	27
70	15					15			

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech Logged By: Don

HVJ Associates, Inc.

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SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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Houston, Texas 77072-1010
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KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

KEMPNER HS

PROJECT NO.: HG1810383.17-G

DRAWING NO.: PLATE A-6

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APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Kempner HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-G

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1									1.50
B-1	3	52	16	36	85.9	12				1.50
B-1	5					36	131	3.41		1.50
B-1	7	38	14	24	83.8	15				1.50
B-1	9					18	130	1.84		1.50
B-1	11	32	15	17	67.1	16				0.92
B-1	13									1.08
B-1	15	43	20	23	87.5	19				1.08
B-1	17					19	156		1.24	1.08
B-1	19									0.67
B-1	24					20	130		1.45	1.33
B-2	1					17				1.50
B-2	3	72	20	52	93.6	20				1.50
B-2	5					21	123	3.09		1.50
B-2	7	56	17	39	94.7	17	131	2.78		1.50
B-2	9									1.33
B-3	1	55	21	34		15				1.50
B-3	3					11	127	3.52		1.50
B-3	5	54	22	32	87.0	15				1.50
B-3	7					16	131	3.57		1.50
B-3	9	45	12	33	94.2	16				1.50
B-3	11									0.83
B-3	13	43	18	25	85.9	17				1.50
B-3	15					20	131		0.87	0.75
B-3	17	33	18	15	95.2	20				0.58
B-3	19					15				0.33
B-3	24					16				
B-4	1									1.50
B-4	3	59	16	43	88.2	14				1.50
B-4	5					15	133	4.09		1.50
B-4	7	40	14	26	86.8	19				1.17
B-4	9					16	132	1.20		1.25
B-4	11	29	12	17	67.7	14				1.33
B-4	13									0.92
B-4	15	25	12	13	69.2	18				0.67
B-4	17					26	126		0.83	0.75
B-4	19					21	131		0.67	0.67
B-5	1	40	14	26	85.2	22				0.58
B-5	3					21	125	0.80		1.08

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Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Kempner HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17-G

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-5	5	57	15	42	88.2	21				1.42
B-5	7					19	119	0.91		0.75
B-5	9	41	14	27	91.3	18				1.25
B-5	11									1.50
B-5	13	42	15	27	92.2	19				1.33
B-5	14.5					15				1.33
Total		**19**	**19**	**19**	**18**	**37**	**15**	**10**	**5**	**44**

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GEOTECHNICAL REPORT
FBISD School Improvements– Turf & Athletics
Willow Ridge High School
Fort Bend County, Texas

SUBMITTED TO

Fort Bend Independent School District (FBISD)

2323 Texas Parkway

Missouri City, Texas 77489

BY

HVJ ASSOCIATES, INC.

HOUSTON, TEXAS

February 09, 2024

REPORT NO. HG1810383.17 –D

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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February 9, 2024

Ms. Paloma Woods
Project Manager
Design and Construction Management
Fort Bend Independent School District
2323 Texas Parkway
Missouri City, Texas 77489

Re: Geotechnical Study
FBISD School Improvements -Turf & Athletics
Willowridge High School
Fort Bend County, Texas
Owner: Fort Bend Independent School District (FBISD)
FBISD Project Number: BP010
HVJ Report No: HG1810383.17- D

Dear Ms. Woods:

Submitted herein is the final geotechnical report for the above referenced project. The study was performed in accordance with our proposal number HG1810383.17 dated September 21, 2023 and is subject to the limitations presented in this report. It has been a pleasure to work for you on this project and we appreciate the opportunity to be of service. Please notify us if there are questions or if we may be of further assistance.

Sincerely,

HVJ ASSOCIATES, INC.
Texas Firm Registration No. F-000646

P. Dahal

Prakash Dahal, PE
Project Engineer



02/09/2024

PD/MH: pd

Copies submitted: 1 (electronic)

The seal appearing on this document was authorized by Prakash Dahal, PE 150264 on February 9, 2024. Alteration of a sealed document without proper notification to the responsible engineer is an offense under the Texas Engineering Practice Act.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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1 EXECUTIVE SUMMARY

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Willowridge HS. The improvements at Willowridge HS involves replacement of softball and baseball press box. This also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at the softball and baseball fields. In addition, a new fence is planned at tennis court. A site vicinity map showing the approximate project location is presented on Plate 1 of the report. Information related to the foundation to be used to support the softball and baseball press box was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system.

The purpose of this study is to provide foundation design and construction recommendations for the structures mentioned above. The subsurface stratigraphy at the project site was investigated by drilling five (5) soil borings to depths varying between 10 and 20 feet below the existing grade. Based on the subsurface conditions revealed by the soil borings, the findings and recommendations of this report are summarized below.

1. Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. Notably, cohesionless soil (ML) was observed in boring B-3 at a depth between 14 and 20 feet. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

2. A literature review of surface faults near the project area was conducted based on the Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas Houston Sheet, Paul Weaver Memorial Edition (revised in 1982). The primary objective of this review was to evaluate available information from published and open file reports. Based on the review, the project site is situated approximately 1-3 miles south of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study.

3. Groundwater was not encountered below the existing grade in any of the borings during the drilling operations. All the borings were dry until the termination depth. However, it should be noted that groundwater conditions observed during drilling may not accurately reflect the groundwater conditions during construction, and therefore should only be considered as approximate. Groundwater levels may fluctuate seasonally and in response to rainfall.

4. Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils sampled at the site, using worst condition (dry state) and the existing condition at the time of drilling. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which is not known at the time of this study. The generalized PVR values in the top 7

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feet of soil within the proposed restroom and storage building area are presented in the table below.

Potential Vertical Rise for the Onsite Soils

Structure	Borings No.	PVR (inches)		
		Dry	Average	Existing
Softball Press Box	B-1	3.39	2.63	3.05
Baseball Press Box	B-3	2.73	2.19	2.73

We anticipate that the softball and baseball press box structures are planned to be supported by a shallow foundation system consisting of slab-on-grade. For these structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. Foundation recommendations are further discussed in Section 6 of this report.

5. Based on the subsurface soils encountered at the project site, the foundation recommendations for the proposed softball and baseball fields and tennis court fence are presented in Section 7 of the report.

Please note that the executive summary provided above does not fully detail our findings and opinions. Descriptions of the full extent of our findings and opinions are only presented through our full report.

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2 INTRODUCTION

2.1 Project Description

HVJ Associates, Inc. was retained by The Fort Bend Independent School District (FBISD) to provide geotechnical recommendations for the proposed Turf and Athletics Improvements at seven (7) FBISD High School (HS) in Fort Bend County, Texas. This report is prepared for the proposed improvements at Willowridge HS. The improvements at Willowridge HS involves replacement of softball and baseball press box. This also includes installation of about 40- and 60-feet nets and replacement of synthetic turfs at softball and baseball fields. In addition, a new fence is planned at tennis court. A site vicinity map showing the approximate project location is presented on Plate 1 of the report.

The purpose of this study is to provide foundation design and construction recommendations for above mentioned structures.

2.2 Geotechnical Study Program

The objectives of this study were to gather information on subsurface conditions and to develop design and construction recommendations for the proposed structures mentioned above. The following objectives were accomplished by:

- Drilling five (5) soil borings to depths between 10 and 20 feet below the existing grade to determine soil stratigraphy and to obtain samples for laboratory testing;
- Performing laboratory tests on soil samples to determine physical and engineering characteristics of the soils;
- Performing engineering analyses to develop design guidelines and recommendations.

Subsequent sections of this report contain descriptions of the field exploration, laboratory-testing program, general subsurface conditions, design recommendations and construction considerations.

3 FIELD EXPLORATION

3.1 Geotechnical Borings

The field exploration program undertaken for the project was performed on November 2nd, 2023. Subsurface conditions at the project locations were investigated by drilling and sampling two (2) soil borings to a depth of 20 feet and two (2) soil borings to a depth of 10 feet for net poles and softball and baseball press boxes and fields and one (1) boring to a depth of 15 feet for tennis court fence. The borings B-1, B-2, B-3 and B-4 were proposed to be drilled inside the softball and baseball field. However, after instructions from FBISD, these borings were drilled outside the field area close to the originally proposed locations. The borings were drilled with truck mounted drilling equipment. The borings were advanced using dry auger techniques to their termination depths. All boreholes were backfilled with soil cuttings and/or bentonite granules upon completion of drilling. The approximate boring locations are shown on Plate 2 of the report.

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3.2 Sampling Methods

Soil samples were obtained continuously to the termination depth of the borings. Cohesive soil samples were obtained with a three-inch thin-walled (Shelby) tube sampler in general accordance with the ASTM D1587 standard. Each sample was removed from the sampler in the field, carefully examined, and then classified. The shear strength of the cohesive soils was estimated by a hand penetrometer in the field. Cohesionless soils were sampled with the split-spoon sampler in accordance with the ASTM D1586 standard. Suitable portions of each sample were sealed and packaged for transportation to our laboratory.

Detailed descriptions of the soils encountered in the borings are given on the boring logs presented in Appendix A, which also includes a Key to Terms and Symbols for the soil classifications used on the boring logs.

3.3 Survey Data

Survey information was not available to us at the time of writing this report; however, the borings were located with a handheld GPS device at the time of drilling. Approximate coordinates and ground elevation of the soil borings are summarized in Table 3-1 below and are presented on the boring logs in Appendix A.

Table 3-1 Borings Survey Data

Boring No.	Coordinates, Feet		Approx. Ground Elevation, Feet
	Latitude, Feet	Longitude, Feet	
B-1	29°35'12.60"N	95°28'45.30"W	70.0
B-2	29°35'14.1"N	95°28'42.8"W	69.0
B-3	29°35'10.5"N	95°28'41.1"W	69.0
B-4	29°35'13.5"N	95°28'37.6"W	67.0
B-5	29°35'05.1"N	95°28'50.3"W	69.0

Note: Approximate ground elevations shown in the table above are obtained from 'Topoview' developed by USGS.

3.4 Groundwater Observations

Attempts were made to measure the groundwater during the drilling operations. Groundwater readings observed in the borings are discussed in Section 5.4 of the report.

4 LABORATORY TESTING

4.1 General

Soil samples transported to our laboratory were further examined and identified in accordance with ASTM D 2488 – *Description and Identification of Soils.* A preliminary soil classification was assigned to each soil sample based on ASTM D 2487 – *Classification of Soil for Engineering Purposes.* Classification

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testing was subsequently conducted on selected samples and the result of each test was used to confirm or modify the given preliminary soil classification.

Selected soil samples were tested in the laboratory to determine applicable physical and engineering properties. All tests were performed according to the relevant ASTM Standards. These tests consisted of moisture content, percent passing No. 200 sieve, Atterberg Limits, Unconfined Compression (UC) and Unconsolidated Undrained Compressive Strength tests.

The Atterberg limits and percent passing No. 200 sieve tests were utilized to verify field classification by the Unified Soils Classification System. The compression tests were performed to obtain the undrained shear strength of the soil. The type and number of tests performed for this investigation are summarized below:

Table 4-1 – Laboratory Testing Summary

Type of Test	Number of Tests
Moisture Content (ASTM D2216)	35
Atterberg Limits (ASTM D4318)	18
Percent Passing No. 200 Sieve (ASTM D1140)	18
Unconfined Compression (ASTM D2166)	12
Unconsolidated-Undrained (ASTM D2850)	2

The laboratory test results are presented on the boring logs in Appendix A. The conversion between pocket penetrometer readings obtained in the field to the shear strength parameters presented in the boring logs were obtained using a conversion factor of 1/3. A summary of laboratory test results is provided in Appendix B.

5 SITE CHARACTERIZATION

5.1 General Geology

There are two major surface geological formations that exist in the Gulf area: the Beaumont formation and the Lissie formation. The Beaumont formation is a relatively younger formation generally found to the southeast of the Lissie formation. The Beaumont formation dips southeastward and extends beneath beach sand and waters of the Gulf of Mexico as far as the continental shelf. The project site is located in an area where the Beaumont formation is typically encountered. A geology map is presented on Plate 3.

The Beaumont formation was deposited on land near sea level in flat river deltas and in inter-delta regions. Soil deposition occurred in fresh water streams and in flood plains (as backwater marsh and natural levees). The courses of major streams and deltaic tributaries changed frequently during the period of deposition, generating within the Beaumont clay a complex stratification of sand, silt and clay deposits. Frequently, stream courses were diverted significant distances from a given point in a backwater marsh, and the water overlying the soil would evaporate since it was cut off from a drainage path. Such water, which would be highly alkaline, would precipitate large nodules of calcium carbonate (calcareous nodules) throughout the surface of evaporation. With the coming of the Second Wisconsin Ice Age, the nearby sea withdrew, leaving the formation several hundred feet above sea level and permitting the soil to desiccate. The process of desiccation compressed the clays

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in the formation such that they became significantly over-consolidated to a large depth. In addition to pre-consolidating the soil, the process of desiccation, together with the later rewetting, produced a network of fissures and slickensides that are now closed but which represent potential planes of weakness in the soil.

5.2 Geologic Faulting

The tectonic history of the Texas Gulf Coast includes a relatively stable depositional cycle since the Cretaceous Period (about 65 million years). During this period the area was subjected to deposition of clays, silts, and sands resulting in over 30 thousand feet of sedimentary rocks. Underlying this clastic sequence are salt formations, which have migrated upwards to produce the typical salt dome features associated with the Texas Gulf Coast. In conjunction with salt movement, dewatering and compaction of some of the deeper sediments in the basin have resulted in the development of growth faults.

A literature review of surface faults near the project area was conducted based on the Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas Houston Sheet, Paul Weaver Memorial Edition (revised in 1982). The primary objective of this review was to evaluate available information from published and open file reports. Based on the review, the project site is situated approximately 1-3 miles south of the Pine Island, Fuqua and Anderson fault and faulting is not anticipated to impact the project site. A detailed fault study is not within the scope of this study. A fault map is presented on Plate 4 of this report.

5.3 Soil Stratigraphy

HVJ's interpretation of soil and groundwater conditions at the project site is based on information obtained at the boring locations only. This information has been used as the basis for our conclusions and recommendations. Significant variations at areas not explored by the project boring may require re-evaluation of our findings and conclusions.

Firm to hard Cohesive Soils (CH & CL) were generally encountered below the existing grade until the termination depth of borings. Notably, cohesionless soil (ML) with clay seams was observed in boring B-3 at a depth between 14 and 20 feet. A detailed description of the soils encountered during our investigation is presented on the boring logs presented in Appendix A.

5.4 Groundwater Level

Attempts were made to measure the groundwater during the drilling operations. However, groundwater was not encountered below the existing grade in any of the borings. All the borings were dry until the termination depth.

It should be noted that groundwater levels determined during drilling may not accurately reflect the true groundwater conditions, and therefore should only be considered as approximate. The water levels may fluctuate seasonally and in response to climatic conditions and with precipitation events.

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6 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL PRESS BOX

6.1 General

The project involves the construction of a softball and baseball press box at Willowridge High School. Information related to the proposed foundation system to support these buildings was not provided to us at the time of writing this report. However, we anticipate that these structures will be supported by a shallow foundation consisting of a slab-on-grade foundation system. The following sections present our assessment of the on-site soils and provide foundation design and construction recommendations for the slab-on-grade foundation system.

6.2 Expansive Soil

One of the major design factors for lightly-loaded structures in the Gulf Coast area is the shrinking and swelling potential of fine-grained soils. Shrink-swell movement occurs in response to soil moisture content changes beneath the slab. Moisture changes occur beneath the slab due to seasonal changes in the relative amount of rainfall and evaporation potential. Soil moisture changes also result from the construction of a slab-on-grade floor. The installation of the slab, vapor barrier, and grade beams reduces the natural moisture transfer from the subsurface beneath the structure, and generally causes the soil moisture content to increase in the soil beneath the structure after construction. Another significant cause of soil moisture change is changes in vegetation, particularly trees associated with landscaping along the structure perimeter. The zone of moisture change was considered to be the top 7 feet of soil in our analysis based on our experience with Houston soils.

Potential Vertical Rise (PVR) values were estimated by the TEX 124-E method for the upper 7 feet of soils at the site, using worst condition (dry state) and the existing condition at the time of boring. The PVR represents the potential ability of a soil material at a specific density, moisture and loading condition to swell. It indicates the potential movement of the soils that may be realized if the soils become wet from a relatively dry condition. The PVR values are provided to demonstrate the relative severity of the swell potential of the clayey soils at the site; however, this value is not intended to be used directly as a design parameter. The actual amount of swell the slab may experience depends on many variables, such as the time of year the slab is poured, which are not known at the time of this study. The generalized PVR values in the top 7 feet of soil at the softball and baseball press box locations are presented in the table below.

Table 6-1 – Potential Vertical Rise for the Onsite Soils

Structure	Boring	PVR (inches)		
		Dry	Average	Existing
Softball Press Box	B-1	3.39	2.63	3.05
Baseball Press Box	B-3	2.73	2.19	2.73

6.3 Slab-on-grade Foundation Recommendations

Foundations for the proposed structure must satisfy two basic design criteria. First, the bearing pressure transmitted by the foundation should not exceed the soil's allowable bearing capacity computed with an adequate factor of safety. Second, foundation movement due to soil volume change must be within desirable limits.

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The softball and baseball press box buildings may be supported on a slab-on-grade foundation system provided that the recommendations to reduce the potential shrink-swell movements discussed in this section are followed. It should be noted that some risks are involved when a slab-on-grade system is utilized. Some vertical movements of the slab are still possible during seasonal soil moisture variations. However, if the recommendations provided below are followed, we expect these movements to be less than 1 inch and not severe enough to cause serious damage to the slab.

For softball and baseball press box structures in order to reduce the PVR to about one inch, we recommend placing the slab-on-grade on a 5-foot thick pad prepared with properly compacted and moisture conditioned structural fill. This may be achieved by replacing the top 5 feet of on-site soils with select compacted fill. We recommend the pad to extend horizontally at least 5 feet beyond the edge of the proposed structure. The exposed surface should be checked and tested if necessary, by qualified geotechnical professionals to identify any soft or weak areas, and debris or undesirable materials, which should be removed and replaced with select fill.

The slab-on-grade foundation may be designed using an allowable bearing capacity of 1,500 psf for a dead load plus sustained live load condition and 2,200 psf for a total net load condition. This bearing capacity recommendation assumes that the subgrade is relatively dry and undisturbed and prepared as discussed in this report. The applied bearing pressure may be determined by the following criteria:

1. Summing the load applied to the foundation, the weight of the foundation, and the weight of any soil backfill placed directly above the foundation;
2. Subtracting the weight of soil excavated from above the foundation depth; and
3. Dividing the total by the base area of the foundation.

The subgrade reaction modulus (k) may be required for the structural design analysis. Based on the encountered subgrade material, a reaction modulus value of 100 pounds per cubic inch (Table 4-1, Technical Manual 5-809-12/AFM 88-3, Chapter 15, 1987, US Army) is recommended.

7 FOUNDATION RECOMMENDATIONS FOR SOFTBALL AND BASEBALL FIELDS AND TENNIS FENCE

7.1 General

We understand that the proposed improvements at Willowridge High School includes installation of about 60 feet high poles at the baseball field and about 40 feet high poles at the softball field and baseball field to support the netting. This will also include installation of new fence at tennis court. The replacement of synthetic turf at softball and baseball fields is proposed too.

7.2 Softball and Baseball Netting Poles and Tennis Court Fence

A design criterion for post and pole foundations is indicated in sections 1806 and 1807 of the 2021 International Building Code. This criterion applies to poles embedded in either earth or in concrete footings in the earth and used to resist lateral loads. The soil parameters that are required to determine the required embedment depth of proposed foundations are presented below. It should be noted that existing grade used in this report refers to elevation of the boring at the time of our field exploration activities.

Lateral Capacity: Ultimate resistance of foundation soils to lateral loads can be provided by friction acting on the base of the foundation and by passive resistance of the soil adjacent to the foundation.

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For concrete foundations poured in good contact with undisturbed natural cohesive soils, allowable friction factor can be taken as 0.19. In addition, allowable passive earth pressure (max 750 psf) can be computed from equivalent fluid density of 98 pcf for natural cohesive soils. These allowable values include a factor of safety of 2.

Allowable Bearing Pressure: We assume that the proposed netting poles will be founded on footings at depths of 4 to 8 feet. The following table provides the allowable bearing capacity for the proposed footings.

Table 7-1 – Allowable Bearing Capacity of Proposed Structures

Proposed Structure	Borings Used	Depth (feet)	Soil Description	Allowable bearing pressure (psf)*
Baseball Pole	B-1 & B-2	7-8	Stiff Clay	2,000
Softball Pole	B-3 & B-4	6-8	Stiff Clay	2,000
Tennis Court Fence	B-5	4-8	Stiff Clay	2,000

Note: '*'- includes factor of safety 3.

Based on our groundwater observations, for excavations drilled to a depth of 4 to 8 feet groundwater will not be encountered. However, it should be noted that groundwater levels may fluctuate seasonally and with other climatic changes. The contractor should be prepared to dewater the footing excavation if groundwater is encountered. Site preparation and select fill recommendations are provided in Section 8 of this report.

7.3 Synthetic Turf

We understand that the project includes replacement of synthetic turf at softball and baseball fields. Details of the replacement are not available at the time of writing this report. We recommend following manufacturer's recommendations for the installation of synthetic turf. We further recommend that an appropriate drainage system should be provided to drain the surface water as quickly as possible. Please refer to section below for the subgrade preparation recommendations.

7.4 Preparation of Subgrade

The subgrade soils for the fields will consist of firm to very stiff Fat Clay (CH). We recommend that at least eight inches of the subgrade be stabilized with 6% of lime for estimation purposes. Stabilization of the subgrade should increase the modulus of subgrade reaction and provide subgrade stability for construction during inclement weather. In addition, subgrade stabilization should enhance long-term pavement performance by reducing the tendency of the soil to displace by pumping. We recommend the following procedures for subgrade preparation.

1. Strip the surface soil to suitable depths. All vegetation and any other deleterious materials or gravels should be removed. Stripped areas should be appropriately graded and shaped to prevent ponding of water.

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2. In areas where soft, compressible or loose soils are encountered, additional stripping may be required. Stripping should extend a minimum of two feet beyond the edge of the proposed fields where possible.

3. Surfaces exposed after stripping should be compacted. Identify any underlying zones or pockets of soft soils and remove such weak materials. If backfill is required, the fill material should be prepared as described in the following section in this report.

4. Before stabilizing the subgrade, scarify the upper eight inches of exposed surface as required, mix with lime and compact it to 95 percent of standard proctor maximum dry density (ASTM D698). The amount of lime shall be determined for subgrade soils by conducting laboratory tests on the exposed subgrade material during construction. Lime stabilization should be in accordance with Section 313213.19 of City of Sugarland Standard Specifications.

8 SITE PREPARATION AND SELECT FILL

The structure area should be stripped of all vegetation, topsoil and all deleterious materials. Stripped areas should be appropriately graded and shaped to provide positive drainage. Following site stripping, the exposed subgrade should be proof-rolled with heavy construction equipment to identify any weak areas. Weak areas, if encountered, should be excavated to firm subgrade and be replaced with select fill. The exposed subgrade should be compacted to at least 95 percent of the materials maximum dry density determined according to ASTM D698 at a moisture content equal to (+3) percentage points of the optimum value. Select fill required to raise the grade should consist of sandy lean clay or lean clay with a liquid limit less than 40 and plasticity index between 8 and 20. Fill material should be placed in loose lifts not exceeding eight inches and should be compacted to 95 percent of the maximum dry density as determined by ASTM D698.

9 DRAINAGE

Drainage around the softball and baseball fields perimeter and also the associated structures is an important consideration in its performance. If an area of poor drainage is allowed to exist around the structures, the soils beneath the slab in that area have greater access to water. This may cause the soils in that area to exhibit higher shrink-swell movements compared to soils away from the area of poor drainage. We recommend that 1-2% grade sloping away from the structures be provided so as to discourage water logging in the field area.

10 DESIGN REVIEW

HVJ Associates, Inc. should review the design and construction plans and specifications prior to release to make certain that the geotechnical recommendations and design criteria presented herein have been properly interpreted.

11 LIMITATIONS

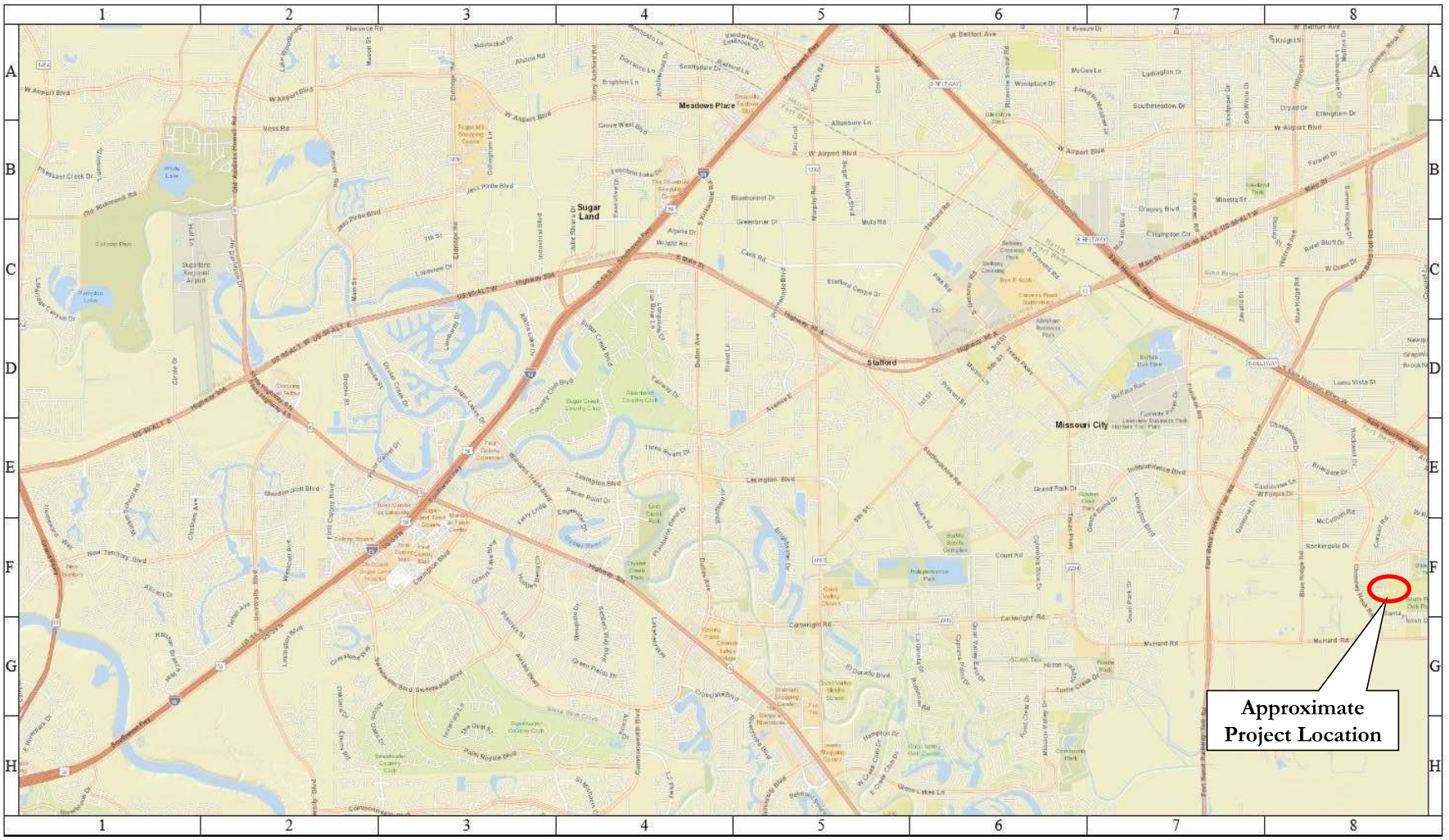
This investigation was performed for the exclusive use of Fort Bend Independent School District (FBISD) for the proposed Turf and Athletics Improvements at Willowridge High School in Fort Bend County, Texas. HVJ Associates, Inc. HVJ Associates, Inc. has endeavored to comply with

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

generally accepted geotechnical engineering practice common in the local area. HVJ Associates, Inc. makes no warranty, express or implied. The analyses and recommendations contained in this report are based on data obtained from subsurface exploration, laboratory testing, the project information provided to us and our experience with similar soils and site conditions. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any subsurface conditions other than those described in our boring logs be encountered, HVJ Associates should be immediately notified so that further investigation and supplemental recommendations can be provided.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

PLATES



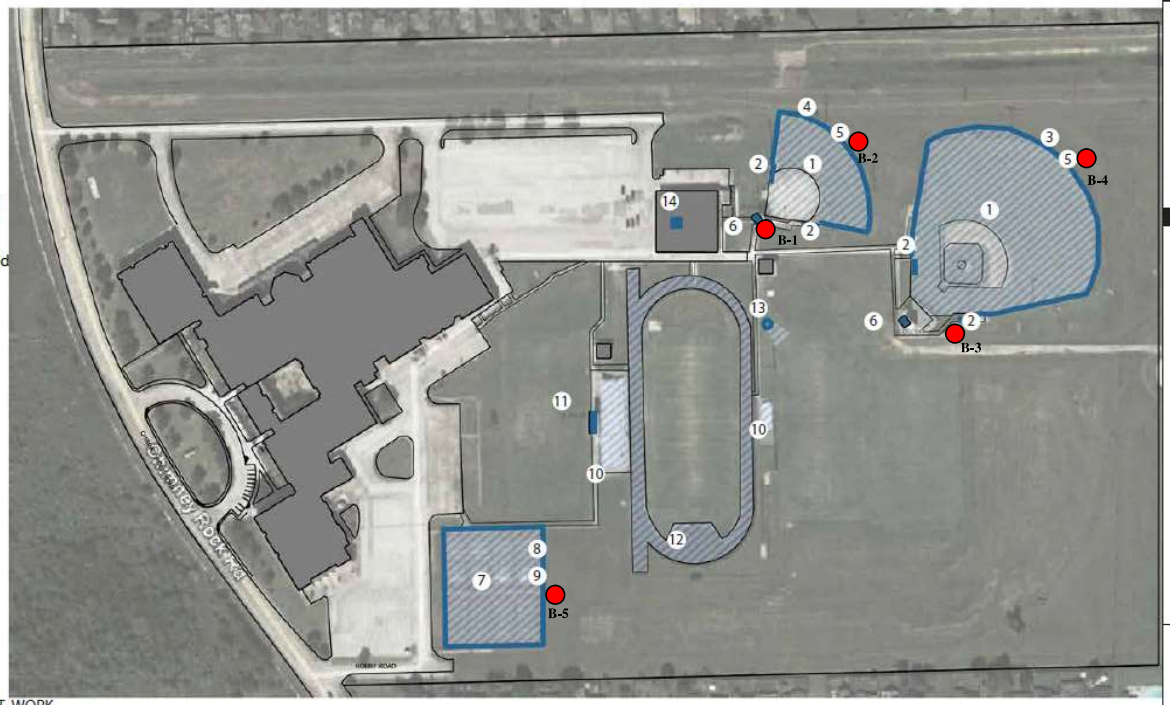
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DATE: 11/16/2023	APPROVED BY: PD	PREPARED BY: EG

SITE VICINITY MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17- D	DRAWING NO.: PLATE 1

1. Replace with synthetic turf
2. Renovate CMU Dugouts
3. 60' net
4. 40' net
5. Fencing and Windscreen
6. Replace Press Box
7. Tennis Court Resurfacing
8. Tennis New Fence
9. Tennis Windscreen
10. Renovate Football Bleachers
11. Renovate Football Press Box
12. Synthetic Track Resurfacing
13. Discus cage and concrete pad
14. Training Room



SECONDARY SUPPORT WORK

EXISTING BUILDINGS

NEW WORK

PRIMARY SITE WORK

0 50' 100' 150' 250' 450'

GRAPHIC BARSCALE

SITE PLAN NEW

N

SCALE : 1/128" = 1'-0"

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16301 Chimney Rock Rd, Houston, TX 77053

FBISD
INSPIRE • EQUIP • IMAGINE
16431 Lexington Blvd.
Sugar Land, TX 77479

Sheet No:14

LEGEND:

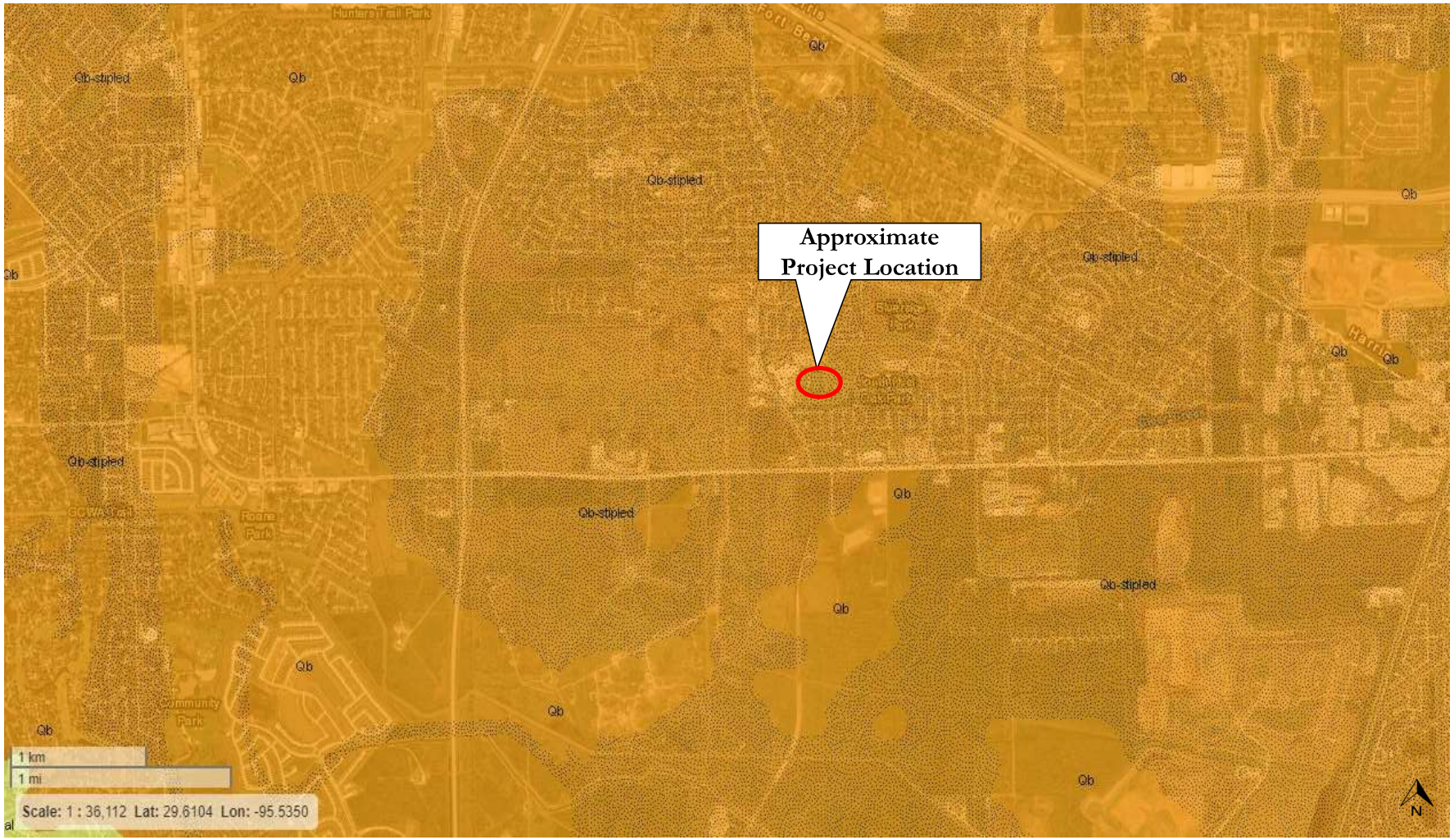
APPROXIMATE BORING LOCATIONS

HVJ ASSOCIATES
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DATE: 11/14/2023	APPROVED BY: PD	PREPARED BY: EG

PLAN OF BORINGS
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17-D	DRAWING NO.: PLATE 2



mrdata.usgs.gov/geology/state/state.php?state=TX

Qb/ Qb-Stipled

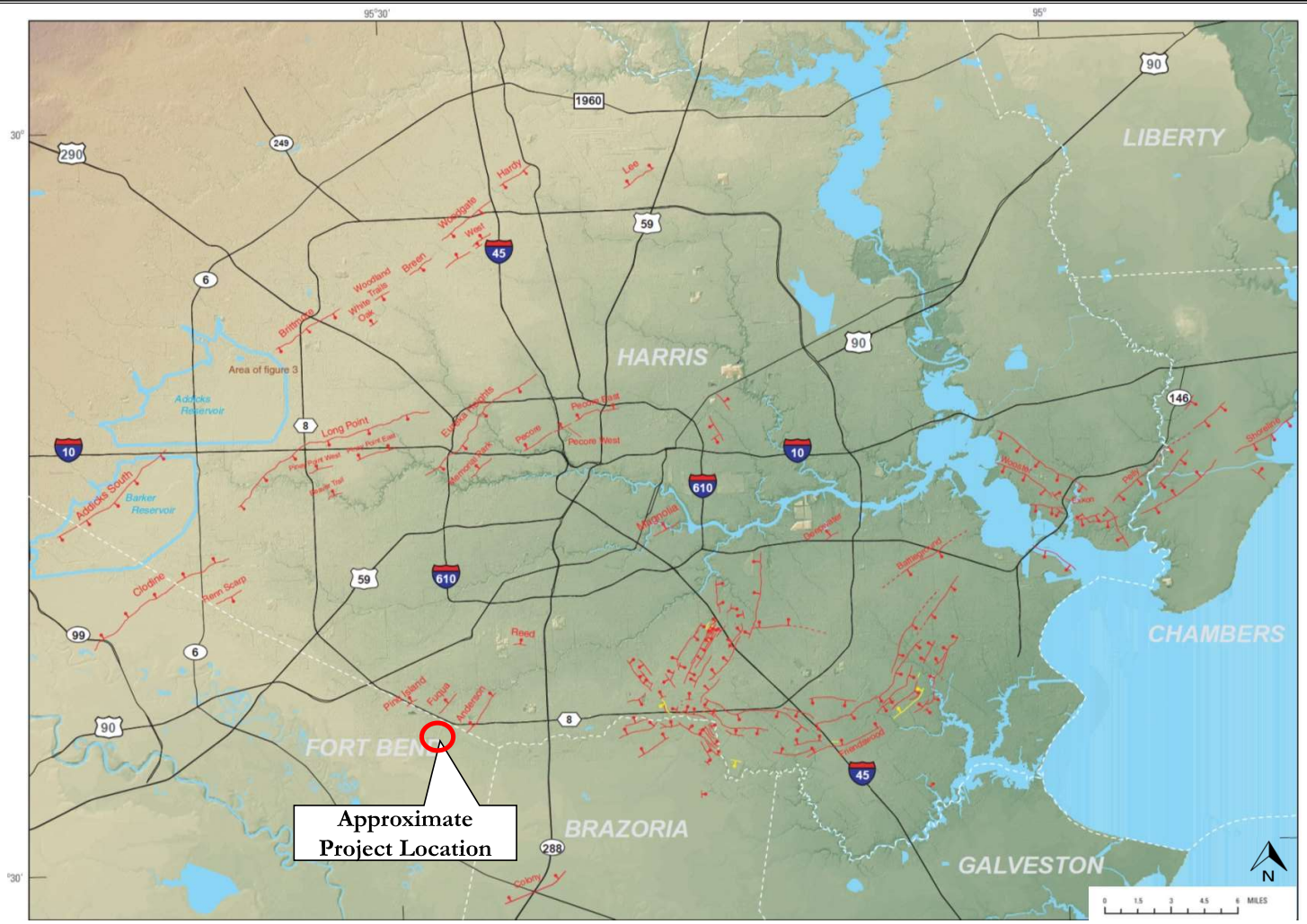
Beaumont Formation (Qb/Qb-stipled) – Mostly clay, silt, and sand; includes mainly stream channel, point-bar, natural levee, backswamp, and to a lesser extent coastal marsh and mud flat deposits; concretions of calcium carbonate, iron oxide, and iron-manganese oxides in zone of weathering; surface almost featureless, characterized by relict river channels shown by meander patterns and pimple mounds on meanderbelt ridges, separated by areas of flow, relatively smooth, featureless backswamp deposits without pimple mounds; thickness ± 100 ft.

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GEOLOGIC MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.: HG1810383.17- D	DRAWING NO.: PLATE 3



Source: Sachin D. Shah and Jennifer Lanning-Rush, 2005.

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DATE: 11/16/2023	APPROVED BY: PD	PREPARED BY: EG

FAULT MAP
FBISD SCHOOL IMPROVEMENTS-
TURF AND ATHLETICS (WILLOW RIDGE HS)

PROJECT NO.:	DRAWING NO.:
HG1810383.17- D	PLATE 4

APPENDIX A

BORING LOGS AND KEY TO TERMS & SYMBOLS

LOG OF BORING B-1

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'12.60"N; 95°28'45.30"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 70.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 20 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
70	0	Firm to stiff, dark brown, brown and gray, FAT CLAY (CH)				27			
				90.3		27	76	27	49
65	5				92	30			
		- with calcareous nodules and ferrous stains at 6'-8'		93.8		28	66	25	41
		Firm to very stiff, reddish brown, LEAN CLAY (CL)			104	24			
60	10	- with calcareous nodules and ferrous stains at 8'-16'		97.4		21	35	22	13
					105	19			
55	15			97.3		23	42	24	18
					100	28			
50	20					10			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-2

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'14.1"N; 95°28'42.8"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 10 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0			Stiff to very stiff, dark brown to brown and gray, FAT CLAY (CH)							
						89.7		26	62	22	40
65	5						96	27			
				- with calcareous nodules and ferrous stains at 6'-8'		90.5		28	67	24	43
				- with calcareous nodules at 8'-10'							
60	10						111	19			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-3

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'10.5"N; 95°28'41.1"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 20 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 20 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Very stiff, drak brown, FAT CLAY WITH SAND (CH) - with roots at 0'-4'		81.9		18	58	19	39
65	5	Very stiff, drak brown to brown, FAT CLAY (CH)		90.0		23	69	19	50
		Stiff to hard, brown and gray, LEAN CLAY WITH SAND (CL) - with calcareous nodules at 6'-12'			119	13			
60	10			82.5		18	40	11	29
					112	14			
		Very stiff, brown and gray, FAT CLAY (CH) - with calcareous nodules at 12'-14'		94.7		24	55	19	36
55	15	Brown, SILT (ML) - with clay seams at 14'-20'				20			
				87.0		17	NP	NP	NP
50	20					13			

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-4

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'13.5"N; 95°28'37.6"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 67.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 10 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 10 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Stiff to very stiff, dark brown to brown and gray, FAT CLAY (CH)				25			
65				86.6	99	26	65	18	47
	5			86.0		25	64	21	43
		- with calcareous nodules and ferrous stains at 6'-8'							
60					110	18			
		- with calcareous nodules at 8'-10'							
				91.7		22	57	21	36
	10								

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

LOG OF BORING B-5

PROJECT: Turf & Athletics Improvements- Willowridge HS
LOCATION: 29°35'05.1"N; 95°28'50.3"W
STATION: N/A
OFFSET: N/A
SURFACE ELEVATION: 69.0 FT

PROJECT NO.: HG1810383.17- D
COMPLETION DEPTH: 15 FT
DATE: 11/2/2023

SAMPLER: Shelby Tube/Split Spoon
DRY AUGER: 0 TO 15 FT
WET ROTARY: N/A TO N/A FT

ELEVATION, FT	DEPTH, FT	DESCRIPTION OF MATERIAL	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %
	0	Stiff to very stiff, dark brown, reddish brown and gray, FAT CLAY (CH) - with roots at 0'-2'		90.5		27	74	24	50
65	5	- with calcareous nodules at 4'-14'			99	24			
		- with gravel at 6'-8'		89.0		27	63	21	42
60	10	- with ferrous stains at 8'-15'			108	19			
				99.0		29	71	25	46
					97	27			
55	15			99.5	103	25	67	23	44

UNDRAINED SHEAR STRENGTH, TSF
○ HAND PENETROMETER
● UNCONFINED COMPRESSION
■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION
△ TORVANE
0.5 1.0 1.5 2.0 2.5

DEPTH TO WATER IN BORING:
▽ FREE WATER DURING DRILLING: ---
▼ WATER DEPTH 24 HOURS AFTER DRILLING: ---

Note: Elevation was obtained from 'Topoview' developed by USGS.

Drilled By: Soil Tech
Logged By: Don

HVJ Associates, Inc.

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

SOIL SYMBOLS

Soil Types


Clay


Silt


Sand


Gravel

Modifiers


Clayey


Silty


Sandy


Cemented

Construction Materials


Asphaltic Concrete


Stabilized Base


Fill or Debris


Portland Cement Concrete

SAMPLER TYPES


Thin Walled Shelby Tube


No Recovery


Auger


Split Barrel


Core


Liner Tube


Jar Sample

WATER LEVEL SYMBOLS


Groundwater level after drilling in open borehole or piezometer


Groundwater level determined during drilling operations

SOIL GRAIN SIZE

Classification	Particle Size	Particle Size or Sieve No. (U.S. Standard)
Clay	< 0.002 mm	< 0.002 mm
Silt	0.002 - 0.075 mm	0.002 mm - #200 sieve
Sand	0.075 - 4.75 mm	#200 sieve - #4 sieve
Gravel	4.75 - 75 mm	#4 sieve - 3 in.
Cobble	75 - 200 mm	3 in. - 8 in.
Boulder	> 200 mm	> 8 in.

DENSITY OF COHESIONLESS SOILS

Descriptive Term	Penetration Resistance "N" * Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

CONSISTENCY OF COHESIVE SOILS

Consistency	Undrained Shear Strength (tsf)	Penetration Resistance "N" * Blows/Foot
Very Soft	0 - 0.125	0 - 2
Soft	0.125 - 0.25	2 - 4
Firm	0.25 - 0.5	4 - 8
Stiff	0.5 - 1.0	8 - 16
Very Stiff	1.0 - 2.0	16 - 32
Hard	> 2.0	> 32

PENETRATION RESISTANCE

3/6	Blows required to penetrate each of three consecutive 6-inch increments per ASTM D-1586 *
50/4"	If more than 50 blows are required, driving is discontinued and penetration at 50 blows is noted
0/18"	Sampler penetrated full depth under weight of drill rods and hammer

* The N value is taken as the blows required to penetrate the final 12 inches

TERMS DESCRIBING SOIL STRUCTURE

Slickensided	Fracture planes appear polished or glossy, sometimes striated
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Inclusion	Small pockets of different soils, such as small lenses of sand scattered through a mass of clay
Parting	Inclusion less than 1/4 inch thick extending through the sample
Seam	Inclusion 1/4 inch to 3 inches thick extending through the sample
Layer	Inclusion greater than 3 inches thick extending through the sample
Laminated	Soil sample composed of alternating partings of different soil type
Stratified	Soil sample composed of alternating seams or layers of different soil type
Intermixed	Soil sample composed of pockets of different soil type and laminated or stratified structure is not evident
Calcareous	Having appreciable quantities of calcium carbonate
Ferrous	Having appreciable quantities of iron
Nodule	A small mass of irregular shape

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KEY TO TERMS AND SYMBOLS USED ON BORING LOGS

WILLOWRIDGE HS

PROJECT NO.: HG1810383.17- D

DRAWING NO.: PLATE A-6

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

APPENDIX B

SUMMARY OF LABORATORY TEST RESULTS

Company Name: HVJ Associates, Inc
Project Name: FBISD School Improvements- Turf and Athletics (Willow Ridge HS)
Location: Fort Bend County, Texas
Project Number: HG1810383.17- D

Borehole	Depth (feet)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Pass #200 Sieve	Moisture Content (%)	Total Unit Weight (pcf)	Shear Strength (UC) (tsf)	Shear Strength (UU) (tsf)	Shear Strength (Pocket Pen) (tsf)
B-1	1					27				0.42
B-1	3	76	27	49	90.3	27				0.50
B-1	5					30	120	0.65		0.58
B-1	7	66	25	41	93.8	28				0.83
B-1	9					24	129	0.85		0.75
B-1	11	35	22	13	97.4	21				1.33
B-1	13					19	125	0.50		1.33
B-1	15	42	24	18	97.3	23				1.50
B-1	17					28	128		1.15	1.25
B-1	19					10				0.42
B-2	1									0.83
B-2	3	62	22	40	89.7	26				0.75
B-2	5					27	122	0.63		0.67
B-2	7	67	24	43	90.5	28				0.75
B-2	9					19	132	0.98		1.50
B-3	1	58	19	39	81.9	18				1.50
B-3	3									1.50
B-3	5	69	19	50	90	23				1.50
B-3	7					13	134	2.73		1.50
B-3	9	40	11	29	82.5	18				1.50
B-3	11					14	128	0.86		1.50
B-3	13	55	19	36	94.7	24				1.25
B-3	15					20				0.42
B-3	17	NP	NP	NP	87.0	17				0.50
B-3	19					13				0.58
B-4	1					25				1.00
B-4	3	65	18	47	86.6	26	125	0.69		0.58
B-4	5	64	21	43	86	25				0.67
B-4	7					18	130	1.81		1.50
B-4	9	57	21	36	91.7	22				1.25
B-5	1									1.17
B-5	3	74	24	50	90.5	27				0.92
B-5	5					24	123	1.19		0.92
B-5	7	63	21	42	89.0	27				1.17
B-5	9					19	129	0.64		1.25
B-5	11	71	25	46	99.0	29				1.25
B-5	13					27	123	0.95		1.33
B-5	14.5	67	23	44	99.5	25	129		1.52	1.17
Total		**18**	**18**	**18**	**18**	**35**	**14**	**12**	**2**	**38**

NP: Non- Plastic

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LEGEND

- SCAN AREA
- E — ELECTRICAL
- ST — STORM
- I — IRRIGATION
- U — UNKNOWN
- CB — CATCH BASIN
- IRR CNTRL VALVE
- LINE CONTINUES
- D= — DEPTH

0 20' 40'

811 Know what's below. Call before you dig.

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

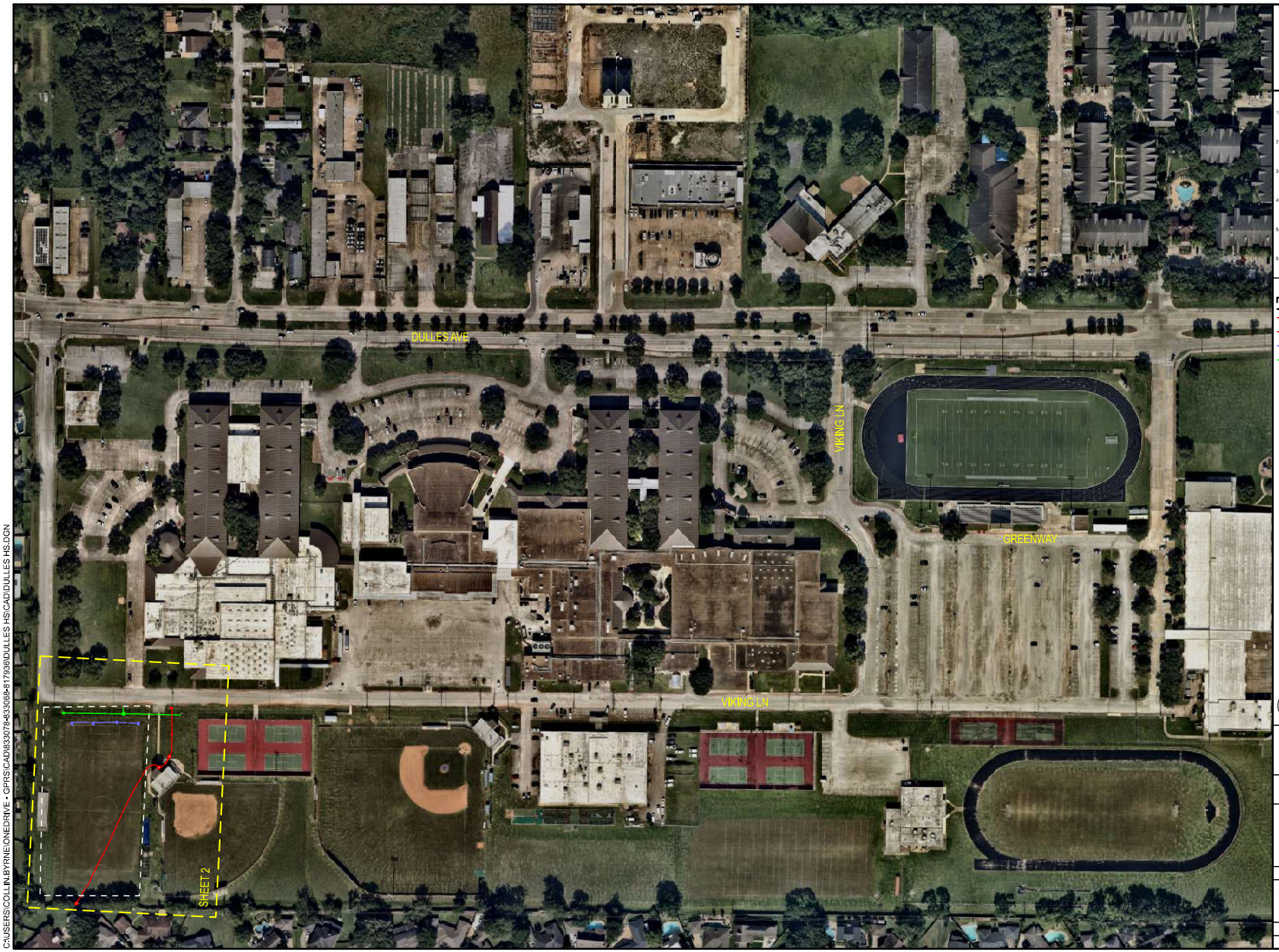
LOCATION:
STEPHEN F. AUSTIN HIGH SCHOOL
3434 PHEASANT CREEK DR
SUGAR LAND, TX 77498

DRAWN BY: ALEX.FRAKER

PROJECT MANAGER:
ERIC HARRIS
281.615.6854
ERIC.HARRIS@GPRSINC.COM

DATE	9/30/2025		
DRAWING NO.	2	REV.	0

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LEGEND

- SCAN AREA
- E — ELECTRICAL
- E◊ — ELECTRICAL DUCT
- I — IRRIGATION
- ST — STORM
- P — ELEC PANEL
- IRR CNTRL VALVE
- CB — CATCH BASIN
- X — END OF INFO
- LINE CONTINUES
- D= — DEPTH

0 100' 200'

811 Know what's below. Call before you dig.

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

LOCATION:
DULLES MIDDLE SCHOOL
500 DULLES AVE
SUGAR LAND, TX 77478

DRAWN BY: COLLIN.BYRNE

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/3/2025		
DRAWING NO.	1	REV.	0

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- IRR CNTRL VALVE
- CB — CATCH BASIN
- X — END OF INFO
- LINE CONTINUES
- D= — DEPTH

0 20' 40'

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

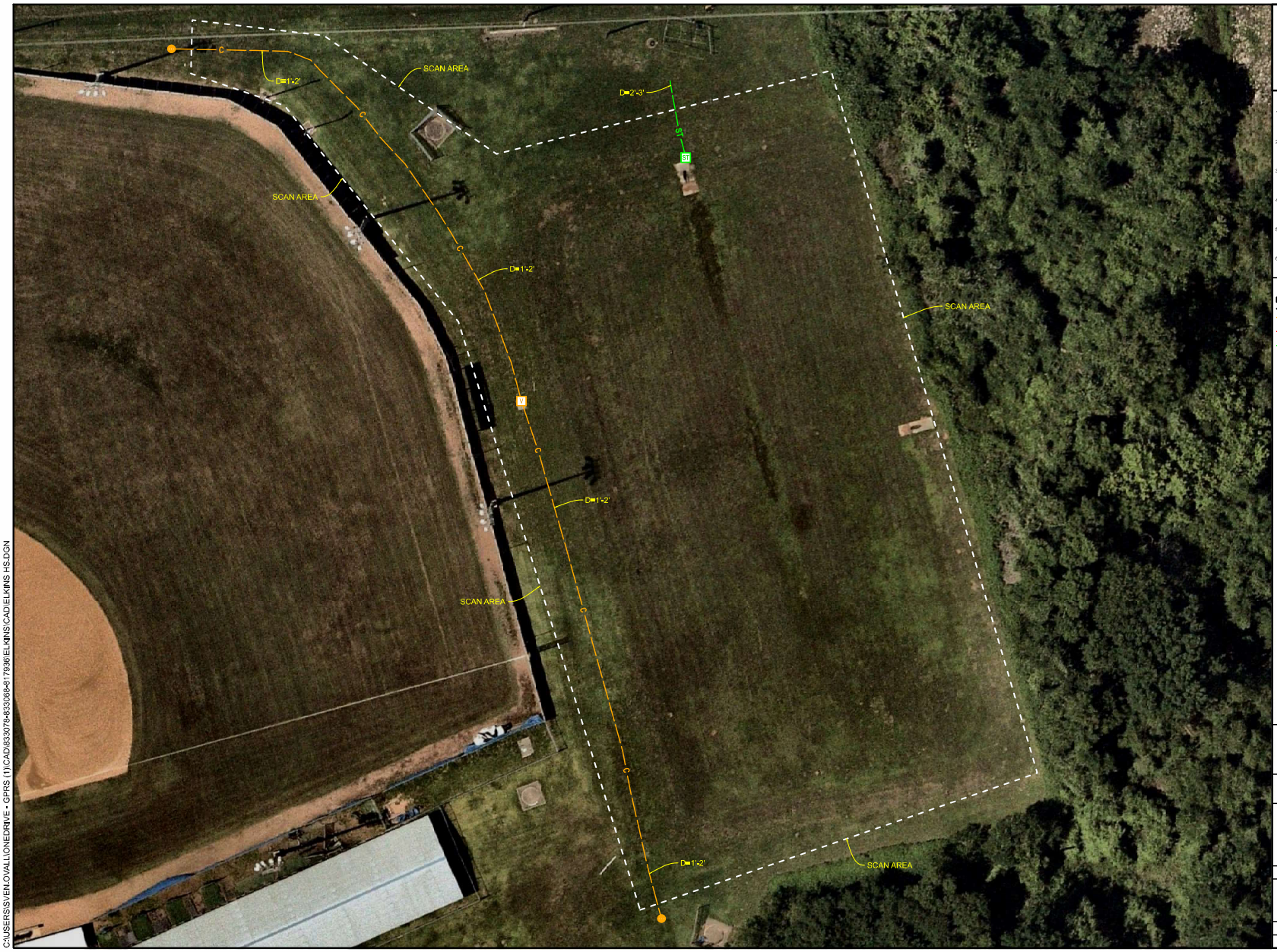
LOCATION:
DULLES MIDDLE SCHOOL
500 DULLES AVE
SUGAR LAND, TX 77478

DRAWN BY: COLLIN.BYRNE

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/3/2025		
DRAWING NO.	2	REV.	0

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LEGEND

- SCAN AREA
- C — COMMUNICATION
- E — ELECTRICAL
- ST — STORM
- V — COMM VAULT
- B — ELEC BOX
- P — ELEC PANEL
- V — ELEC VAULT
- E — ELEC MISC
- SITE LIGHT
- IRR CNTRL VALVE
- CB — CATCH BASIN
- R — ROOFDRAIN
- SC — STRM CLEANOUT
- SC — SAN CLEANOUT
- X — END OF INFO
- LINE CONTINUES
- D= — DEPTH

0 20' 40'

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

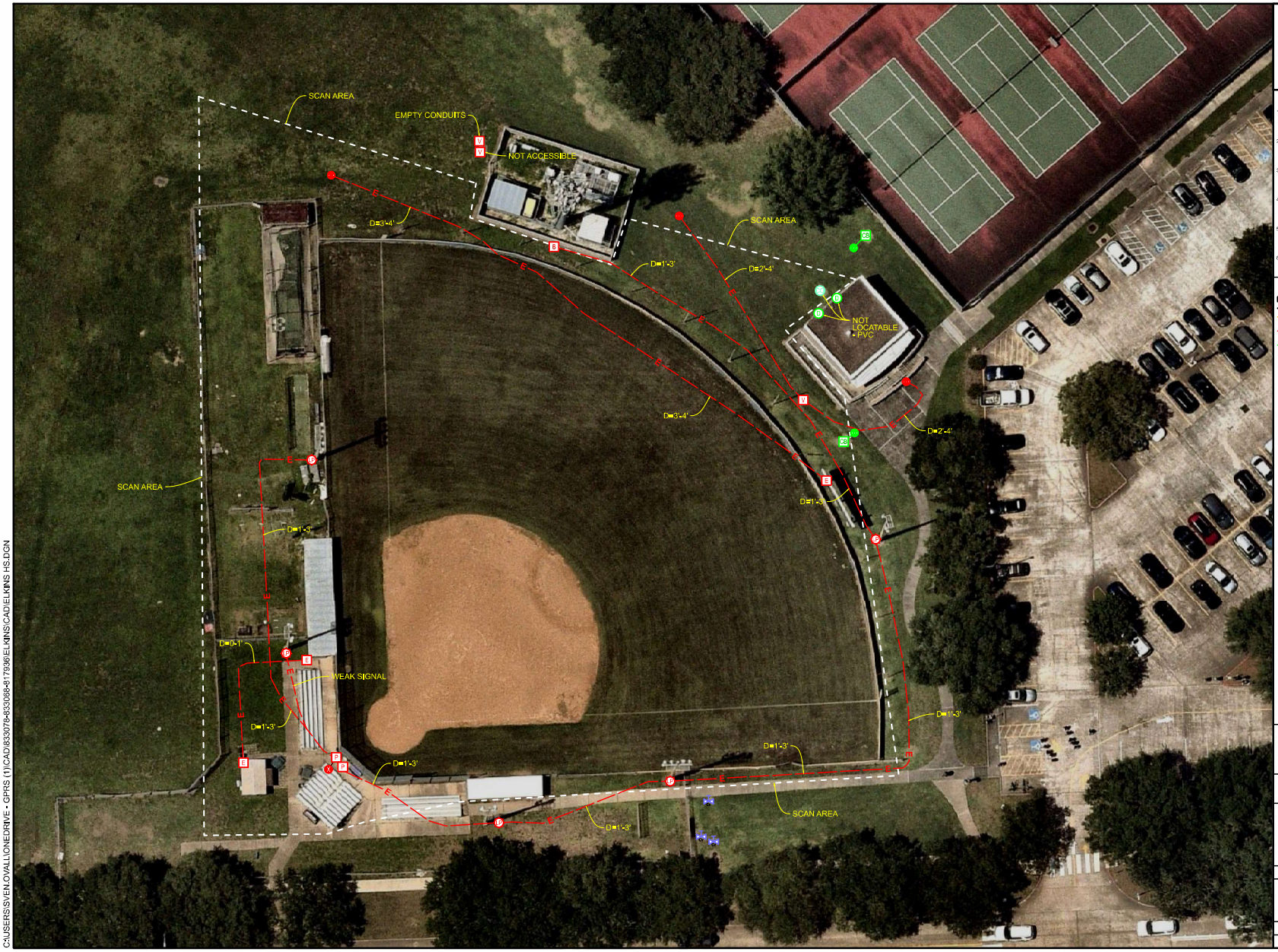
LOCATION:
ELKINS HIGH SCHOOL
7007 KNIGHTS CT
MISSOURI CITY, TX 77459

DRAWN BY: SVEN.OVALL

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/6/2025		
DRAWING NO.	2	REV.	0

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LEGEND

- SCAN AREA
- C — COMMUNICATION
- E — ELECTRICAL
- ST — STORM
- V — COMM VAULT
- B — ELEC BOX
- P — ELEC PANEL
- V — ELEC VAULT
- E — ELEC MISC
- SITE LIGHT
- IRR CNTRL VALVE
- CB — CATCH BASIN
- R — ROOFDRAIN
- SC — STRM CLEANOUT
- SC — SAN CLEANOUT
- X — END OF INFO
- LINE CONTINUES
- D= — DEPTH

0 20' 40'

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

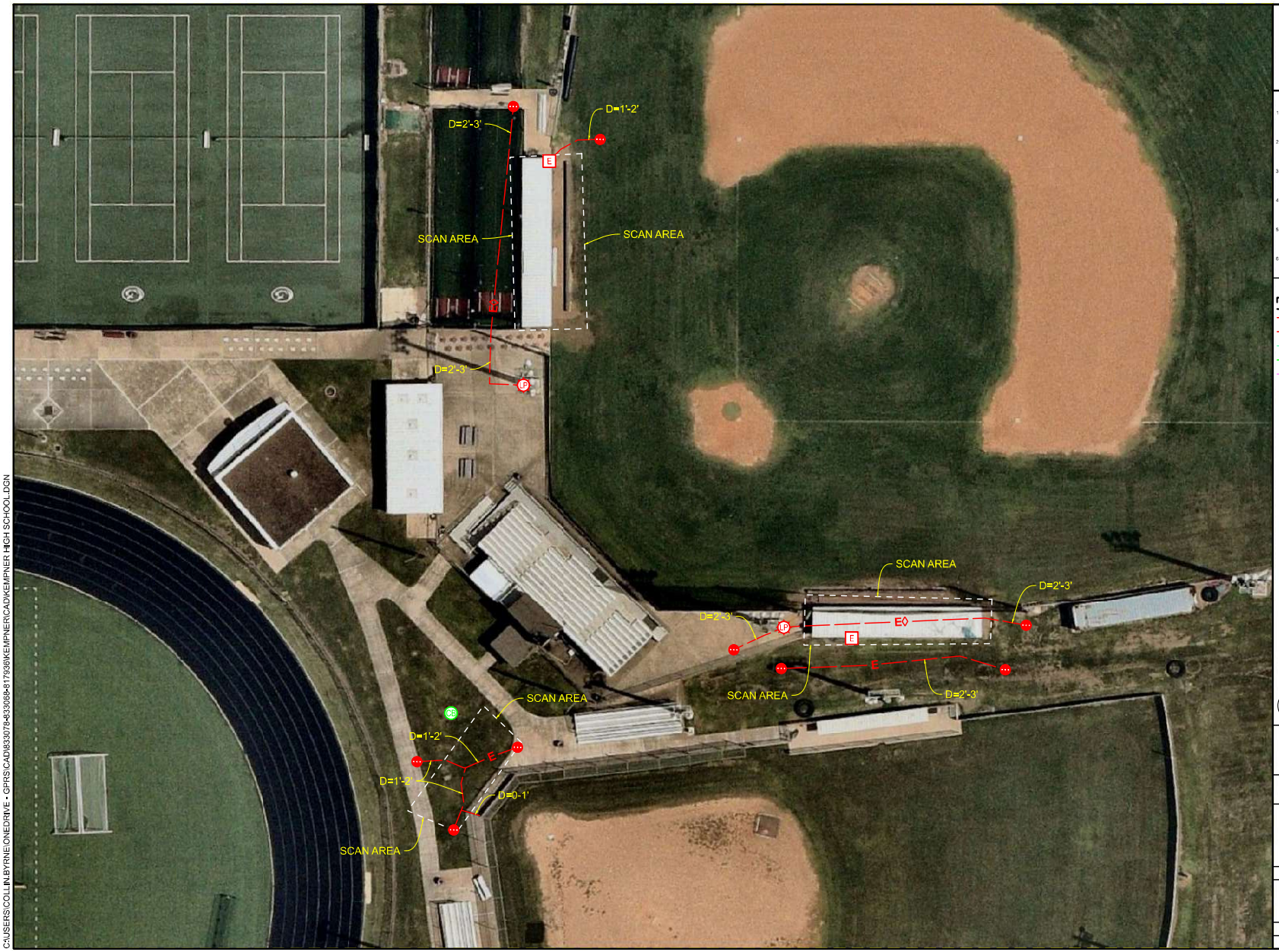
LOCATION:
ELKINS HIGH SCHOOL
7007 KNIGHTS CT
MISSOURI CITY, TX 77459

DRAWN BY: SVEN.OVALL

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/6/2025		
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LEGEND

- SCAN AREA
- E — ELECTRICAL
- E◊ — ELECTRICAL DUCT
- SS — SANITARY
- ST — STORM
- U — UNKNOWN
- P — COMM PEDESTAL
- B — ELEC BOX
- C — ELEC CABINET
- E — ELEC MISC
- LP — SITE LIGHT
- S — SAN MANHOLE
- CB — CATCH BASIN
- IRR CNTRL VALVE
- M — WTR METER
- X — END OF INFO
- LINE CONTINUES
- D= — DEPTH

0 15' 30'

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

LOCATION:
KEMPNER HIGH SCHOOL
14723 VOSS RD
SUGAR LAND, TX 77498

DRAWN BY: COLLIN.BYRNE

PROJECT MANAGER:
ERIC HARRIS
281.615.6854
ERIC.HARRIS@GPRSINC.COM

DATE	10/2/2025		
DRAWING NO.	2	REV.	0

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LEGEND

SCAN AREA

IRR CNTRL VALVE

0 100' 200'

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FOR INFORMATION ONLY

GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

LOCATION:
WILLOWRIDGE HIGH SCHOOL
16301 CHIMNEY ROCK RD #907
HOUSTON, TX 77053

DRAWN BY: COLLIN.BYRNE

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/6/2025		
DRAWING NO.	1	REV.	0

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LEGEND

SCAN AREA

IRR CNTRL VALVE

0 25' 50'

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GPRS UTILITY FINDINGS MAP

PREPARED FOR:
PFLUGER ARCHITECTS

LOCATION:
WILLOWRIDGE HIGH SCHOOL
16301 CHIMNEY ROCK RD #907
HOUSTON, TX 77053

DRAWN BY: COLLIN.BYRNE

PROJECT MANAGER:
DANIEL WILSON
832.262.3438
DANIEL.WILSON@GPRSINC.COM

DATE	10/6/2025		
DRAWING NO.	2	REV.	0

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SECTION 00 31 13 PHASING SCHEDULE

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 attachments are not part of the Contract Documents.

B. Available Project information includes the following:

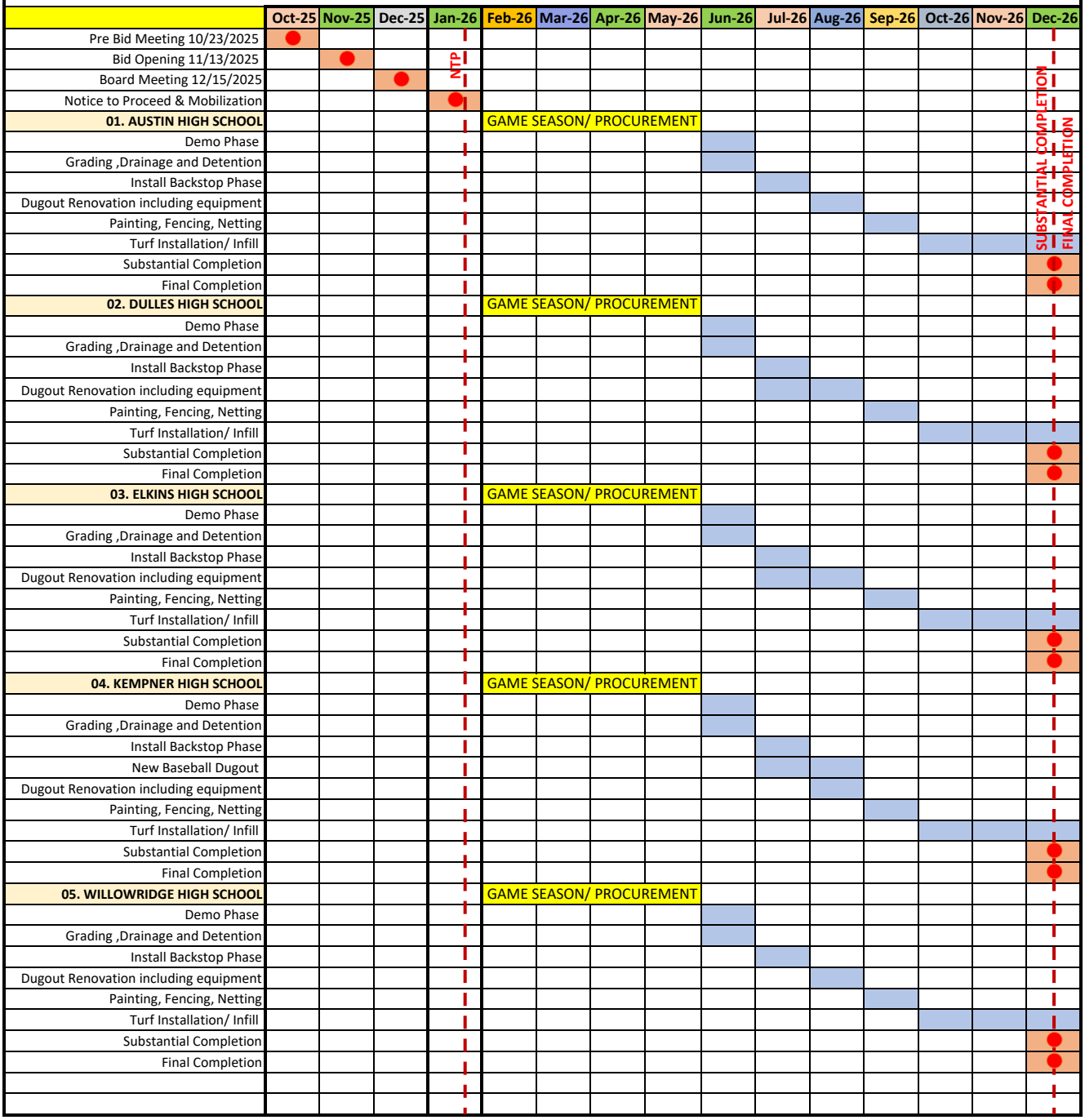
1. Project Schedule

C. Phasing schedule is included as part of this section.

END OF SECTION

CSP 26-021KB

Project Schedule



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

CSP No: CSP 26-021KB **BP** 010 - **BP Name:** Turf & Athletics

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 Provsisions must be clearly indicated in Vendor's Solicatiation Response. No-bid is deemed non-responsive by FBISD.

Having examined Proposal and Contract Documents prepared by Fort Bend ISD and Pfluger Architects dated 10/9/2025 and having examined site conditions, the undersigned proposes to furnish all labor, equipment and materials and perform all work for the completion of the above-named project for the sum indicated below.

I. DESCRIPTION: The project includes installation of artificial turf at baseball and softball fields and associated renovations at five (5) high school campuses Austin High School, Dulles High School, Elkins High School, Kempner High School and Willowridge High School (BP010).

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 365 calendar days to complete. Contractor agrees the work will be substantially completed within Enter no of calendar days 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 Enter PKG no._____

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. UNIT PRICES – BASE BID

UNIT PRICES – FOUNDATION

A. Provide unit pricing for straight shaft drilled piers in lieu of drilled bell bottom piers –same depth as indicated on the Drawings:

01	☐24" Diameter	_____ Each (EA)
02	☐30" Diameter	_____ Each (EA)
03	☐36" Diameter	_____ Each (EA)
04	☐42" Diameter	_____ Each (EA)
05	☐48" Diameter	_____ Each (EA)
06	☐54" Diameter	_____ Each (EA)
07	☐60" Diameter	_____ Each (EA)
08	☐66" Diameter	_____ Each (EA)
09	☐72" Diameter	_____ Each (EA)
10	☐ add diameter Diameter	_____ Each (EA)
11	☐ add diameter Diameter	_____ Each (EA)
12	☐ add diameter Diameter	_____ Each (EA)
13	☐ add diameter Diameter	_____ Each (EA)
14	☐ add diameter Diameter	_____ Each (EA)

B. Provide unit pricing for auger cast piling:

01	☐14” Diameter	_____ Lin. Foot (LF)
02	☐16” Diameter	_____ Lin. Foot (LF)
03	☐18” Diameter	_____ Lin. Foot (LF)
04	☐20” Diameter	_____ Lin. Foot (LF)
05	☐24” Diameter	_____ Lin. Foot (LF)
06	☐ add diameter Diameter	_____ Lin. Foot (LF)
07	☐ add diameter Diameter	_____ Lin. Foot (LF)
08	☐ add diameter Diameter	_____ Lin. Foot (LF)
09	☐ add diameter Diameter	_____ Lin. Foot (LF)
10	☐ add diameter Diameter	_____ Lin. Foot (LF)

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

B. Provide unit pricing for the following electrical power work:

01	☐Add/Delete Contractor generated power to the site/project (in the absence of CenterPoint power availability).	_____ Per Month

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)

UNIT PRICES – Add Description

01	☐ add description	_____ add unit

02	☐ add description	_____ add unit
03	☐ add description	_____ add unit
04	☐ add description	_____ add unit
05	☐ add description	_____ add unit

VI. CHANGES IN THE WORK

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

VII. PROPOSAL EVALUATION WAIVER

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

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

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

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

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

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

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

_____ **ADD-01** dated _____ Total # pgs_____ **ADD-02** dated _____ Total # pgs_____

_____ **ADD-03** dated _____ Total # pgs_____ **ADD-04** dated _____ Total # pgs_____

_____ **ADD-05** dated _____ Total # pgs_____ **ADD-06** dated _____ Total # pgs_____

_____ **ADD-07** dated _____ Total # pgs_____ **ADD-08** dated _____ Total # pgs_____

(b) CONTRACTOR has examined the site and locality where the work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules and regulations) and the conditions effecting cost, progress or performance of the work and has made such independent investigations as CONTRACTOR deems necessary.

(c) This PROPOSAL is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; CONTRACTOR has not directly or indirectly induced or solicited any other Contractor to submit a false or sham Proposal; CONTRACTOR has not solicited or induced any person, firm or a corporation to refrain from submitting a proposal; and CONTRACTOR has not sought by collusion to obtain for himself any advantage over any other Contractor or over OWNER.

Type of Proposer's Organization:

_____

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

Proposer: _____
(Print or Type)

_____
Signature of Proposer

Title of Office: _____
(Print or Type)

Legal Address: _____
(Print or Type)

_____

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

ATTEST:

_____
(Secretary, if Proposer is a Corporation

SEAL:
(If Corporation)

SECTION AC

PACKAGE "B" ALTERNATE BID PROPOSAL FORM – CSP STIPULATED SUM

CSP No: CSP 26-021KB **BP** 010 **BP Name:** Turf & Athletics

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 Pfluger Architects dated 10/09/2025 and having examined site conditions, the undersigned proposes to furnish all labor, equipment and materials and perform all work for the completion of the above-named project for the sum indicated below.

I. DESCRIPTION: The project includes installation of artificial turf at baseball and softball fields and associated renovations at five (5) high school campuses Austin High School, Dulles High School, Elkins High School, Kempner High School and Willowridge High School (BP010).

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 **365** calendar days to complete. Contractor agrees the work will be substantially completed within Enter no of calendar days 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 Enter PKG no. _____ Base Proposal

BP Enter PKG no. _____ Alternates
BP Enter PKG no. _____ 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 <u>all base bid work</u> and adjust the final base bid lump sum amount as follows:

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

Alternate No. 2 Deviations Request Form

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

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
2. _____Dollars
   (Amount written in words governs)

   $_____
   Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

   _____

Alternate No. 3 Dulles High school detention under the Turf Field: Ref Drawings Alternate No. 3

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

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐
2. _____Dollars
   (Amount written in words governs)

   $_____
   Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

   _____

Alternate No. 4 Monofilament as an alternate to Hybrid on all Fields Alternate No. 4

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

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐

   _____Dollars
   (Amount written in words governs)

   $_____
2. Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

   _____

Alternate No. 5 All Fields to receive new Foul Poles Alternate No. 5

If the owner elects to proceed with Alternate No. 5 the undersigned agrees to complete the ADDITIVE work for the lump sum amounts of:

1. Add ☐ Deduct ☐ No Change ☐ Not Applicable ☐

   _____Dollars
   (Amount written in words governs)

   $_____
2. Amount written in figures
3. Add ☐ Deduct ☐ No. of calendar days to adjust the Contract Time for this alternate:

   _____

Alternate No. 6 Electrical upgrades and Glue down Turf for all Ten Dugouts Alternate No. 6

If the owner elects to proceed with Alternate No. 6 the undersigned agrees to complete the ADDITIVE work for the lump sum amounts of:

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

Alternate No. 7 Paint Five (5) Softball Outfield Fences and Five(5) Baseball Outfield Fences Alternate No.7

If the owner elects to proceed with Alternate No. 7 the undersigned agrees to complete the ADDITIVE work for the lump sum amounts of:

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

_____ **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_____

(a) 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.

(b) 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

RETURN THIS DOCUMENT IN CSP BID/PROPOSAL PACKAGE

SEAL:
(If Corporation)

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:
CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025
(1397578103)

TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

EXHIBIT A INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[ ] The date of this Agreement.

[X] 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:
CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

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

[X] By the following date:

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

Portion of Work	Substantial Completion Date

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

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

Item	Price	Conditions for Acceptance

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

Item	Price

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)
Attached as Exhibit E		

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

$1,000.00 per calendar day that substantial completion is delayed.
$250.00 per day for each calendar day for non-completion of punch list items and contract close-out within 60 days after substantial completion

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

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User Notes:
CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025
(1397578103)

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%)

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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.)

%

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.)

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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

[X] 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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§ 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.)

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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

[ ] 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)*	**CONTRACTOR** *(Signature)*
Dr. Christie Whitbeck, Superintendent Fort Bend Independent School District	.
(Printed name and title)	*(Printed name and title)*

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Additions and Deletions Report for
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PAGE 1

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

PAGE 2

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

PAGE 3

[X] By the following date:

...

Attached as Exhibit E

...

$1,000.00 per calendar day that substantial completion is delayed.
$250.00 per day for each calendar day for non-completion of punch list items and contract close-out within 60 days after substantial completion

PAGE 4

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

...

Five Percent (5%)

PAGE 5

At the Owner's sole discretion

~~**§ 5.1.7.3** Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:~~
~~*(Insert any other conditions for release of retainage upon Substantial Completion.)*~~

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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.

PAGE 6

[**X**] Litigation in a court of competent jurisdiction

...

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

PAGE 7

.2 ~~AIA Document A101™–2017,~~ Attached as Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for ~~Construction~~Construction, as amended by the Owner.

...

Attached as Exhibit D

...

Attached as Exhibit C

PAGE 8

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

...

Dr. Christie Whitbeck, Superintendent
Fort Bend Independent School District .

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

_____

(Signed)

_____

(Title)

_____

(Dated)

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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)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

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

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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.

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§ 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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§ 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 is 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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§1.9 Miscellaneous Other Definitions

§1.9.1 Addenda, Addendum. Documents issued by the Architect prior to execution of the Owner Contractor Agreement for this Project that modify or clarify the Proposal Documents. All addenda become a part of the Contract Documents.

§1.9.2 Alternate Proposal(s). A separate amount stated on a separate Proposal Form which, if accepted by the Owner, will be added to or deducted from the Base Proposal. If accepted, the work that corresponds to the alternate proposal will become part of the agreement between Owner and Contractor. Alternate proposals shall remain valid for the same period of time as the Base Proposal after receipt of proposals, regardless if an Owner Contractor Agreement has been executed, unless indicated otherwise herein.

§1.9.3 Approved, Approved Equivalent, Approved Equal, or Equal. The terms Approved, Approved Equivalent, Approved Equal, and Or Equal, relate to the substitution of products or systems approved in writing by the Architect. Refer to Paragraph 3.4.2, Substitution of Products and Systems, for procedures which must be followed after award of contract. The substitution procedure process to be followed prior to receipt of proposals is described in the Instructions to Bidders.

§1.9.4 Base Proposal. The Contractor's proposal for the Work, not including any Alternates.

§1.9.5 Contract Time. The period of time which is established in the Contract Documents for Substantial Completion of the Work. This period of time is subject to authorized adjustments as enumerated in the Contract Documents.

§1.9.6 Date of Agreement. The date the Owner formally awards a Contract for Construction of the Work. This date will be inserted in the first page of the Agreement between Owner and Contractor and shall be referenced in Performance Bond and Payment Bond forms. See also Date of Commencement of Work.

§1.9.7 Date of Commencement of the Work. The date of a written Notice to Proceed to the Contractor for a given portion of the Work. This date constitutes day zero (0) of the stated Contract Time. The Notice to Proceed will be issued after the District has received and validated the Contractor's Payment Bond, Performance Bond and Insurance.

§1.9.8 Date of Final Completion. The end of construction. See AIA Document A201, Section 9.10.

§1.9.9 Day. The following days are referenced in the documents:

.1 **Calendar Days**: The Contract Time is established in Calendar Days and extensions of time granted for Regular Work Days lost, if any, will be converted to Calendar Days.

.2 **Holidays:** The days officially recognized by the construction industry in this area as a holiday; normally limited to the observance days of New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and the day after and Christmas Day.

.3 **Regular Work Days:** All calendar days except holidays, Saturdays, and Sundays. Requests for extensions of time shall be requested on the basis of Regular Work Days, and those days, if approved, will be converted to calendar days by multiplying by a factor of one and four-tenths (1.4).

.4 **No extensions of the Contract Time will be granted due to inclement weather except as stated in Section 8.3.1.**

§ 1.9.10 Final Completion. Achieved after the Work has been completed by the Contractor, the final inspection has been performed by the Architect and the Owner, the Contract Closeout process has been completed, and the final Certificate for Payment has been issued by the Architect to the Owner. See Sections 1.1.14 and 9.10 and Specification sections regarding Contract Close Out.

§1.9.11 Notice to Proceed. A notice that may be given by the Owner to the Contractor that directs the Contractor to start the Work. It may also establish the Date of Commencement of the Work.

§ 1.9.12 The Project Manual. A volume assembled for the Work which may include the Proposal requirements, sample forms, Conditions of the Contract, Drawings and Specifications.

§ 1. 9.13 Proposal. A complete and properly signed proposal to do the Work for the sums stipulated therein, submitted

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on the prescribed forms in accordance with the Proposal Documents.

§ 1.9.14 Proposal Documents. All documents and bound into or referenced in the Project Manual, the Drawings, and Addenda related thereto. The Project Manual contains the Proposal requirements, Contract and other forms, Conditions of the Contract, the Specifications, and a list of Drawings and Schedules, some of which are bound into the Project Manual (other Drawings and Specifications are bound separately).

§ 1.9.15 Proposer. A person or entity who submits a Proposal.

§**1.9.16 Provide.** Whenever the word "provide" is used in these documents, it shall mean the same as "furnish and install".

§**1.9.17 Punch List.** A comprehensive list prepared by the Contractor prior to Substantial Completion to establish all items to be completed or corrected; this list may be supplemented by the Architect or Owner. See AIA Document A201, Section 9.8.

§ 1.9.18 SMALL BUSINESS ENTERPRISE PROGRAM ("SBEP"). Owner has adopted the SBEP to provide increased business opportunities for locally certified small businesses to competitively participate in contracting and procurement within FBISD. *See* FBISD Board Policy CV(Local).

§ 1.9.19 SUB-PROPOSER. A person or entity who submits a Proposal to a Proposer for materials, equipment or labor for a portion of the Work.

§**1.9.20 Unit Prices.** A cost for a unit of work as described in the Contract Documents. The Owner may add or deduct Unit Price work at the amounts stated on the Proposal Form and such amounts shall not be subject to additional mark up by the Contractor or his subcontractors."

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. All parties understand that only the Board of Trustees for the Owner acting as a body corporate has the authority to bind the Owner with respect to all matters requiring the Board's approval under current policy of the Board of Trustees for the Owner, including, but not limited to, Change Orders. Except as otherwise provided in Section 4.2.1, the Architect does not have authority to bind the Owner with respect to matters requiring the Owner's approval or authorization. The term "Owner" means the Owner or the Owner's authorized representative.

(Paragraph deleted)

§ 2.1.2 The Board of Trustees, by majority vote, is the only representative of the Owner, an independent school district, having the power to enter into a contract, to approve a Change Order requiring an increase in the Contract Sum, or agree to an extension to the contractual Completion Date, unless this authority is lawfully delegated. Neither Architect nor Contractor may reply upon the direction of any employee of Owner or Program Manager who has not been designated in writing by the Superintendent of Schools or Board of Trustees of Owner; Owner shall not be financially responsible for actions taken by the Architect or Contractor in reliance upon direction from unauthorized persons.

§ 2.1.3 The presence of the Owner, Program Manager or Architect at the Work site does not imply acceptance or approval of the Work.

§ 2.1.4 The Owner, being a public body under the laws of the State of Texas, must have funds in the full amount of the Contract on hand prior to award and execution of the Contract. Furthermore, no Contract exists between the Owner and the Contractor until the formation of the Contract is approved by a majority of the Board of Trustees of the Owner in open session at a duly held Board meeting, and the contract is signed by an authorized Owner's representative.

§ 2.1.5 At any time prior to the Owner's receipt of the executed Agreement with the required bonds and insurance, the Owner may, at its sole option and without cause, reject the offer described in this Agreement by delivering to the Contractor a written notice stating so. Such notice shall be signed by the Owner's Director of Purchasing or designee, and shall be effective on receipt by the Contractor. The rejection of the offer described in this Agreement, shall cause

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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 require 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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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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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 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

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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 RELASES, 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.

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§ 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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§ 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

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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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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 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 ¼ 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.

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§ 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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identified.

§ 3.21 Antitrust Violations

§ 3.21.1 Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et.seq. (1973). The Contractor shall include this provision in his contracts with each Subcontractor and Supplier. Each Subcontractor shall include such provision in contracts with Sub-subcontractors and suppliers.

§ 3.22 Third-Party Beneficiary

§ 3.22.1 No person or entity shall be deemed to be a third-party beneficiary of any provision(s) of this Contract; nor shall any provision(s) hereof be interpreted to create a right of action or otherwise permit anyone not a signatory party to the Contract to maintain an action for personal injury or property damage.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 Except as expressly provided herein, the Contractor shall not be relieved of Contractor's obligation to perform the Work in strict accordance with the Contract Documents by the responsibilities, activities or duties of the Architect.

§ 4.2 Administration of the Contract

§ 4.2.1 Certain portions of the administration of the Contract will be performed by the Architect, others by the Program Manager. Both the Architect and the Program Manager will be treated as the Owner's representative to the extent set out in the Contract Documents. Neither the Architect nor the Program Manager shall have the authority to act on behalf of Owner unless such authority is expressly granted in the Contract Documents, nor shall such authority be implied from any act or representation of the Architect or Program Manager..

§ 4.2.2 The Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the work, and (3) to determine in general if the work is being performed in a manner indicating that the work, when fully completed, will be in accordance with the Contract documents. The Architect will be required to make on-site inspections as necessary to keep the Owner informed of the progress of the Work and as necessary to guard the Owner against defects and deficiencies in the Work. The Architect will neither have control over or charge of, no be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1. Further:

.1 The Contractor expressly recognizes that the Architect does not owe him any duty to supervise or direct his work as to protect the Contractor from the consequences of his own acts or omissions.

.2 Upon reasonable request by the Owner, the Contractor shall accompany the Owner and Architect on an observation tour(s) of the building and shall note any defects and start remedying these defects within ten (10) days of the observation tour. Contractor shall prosecute the Work without interruption until accepted by the Owner and the Architect.

.3 Section 4.2.2, and the provisions of the Architect's Agreement with the Owner shall govern the number of site visits by the Architect. In this case, the Owner and Architect may agree in writing on an alternative site visit schedule that is appropriate for this particular project.

.4 If during the Architect's site visits the Architect observes any deviation from requirements of the Contract Documents, the Architect (or designee) shall report within three (3) business days to the Owner any such deviation. A copy of said report shall be sent to the

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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.

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§ 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.

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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.

§ 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.

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§ 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.

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.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

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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.

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.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.

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§ 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.

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§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents In order to initiate and facilitate the preparation of the Contractor's list of items to be completed or corrected (Punch List), the Architect and Program Manager, if requested by the Contractor, will inspect a few representative rooms with the Contractor's superintendent and the office project manager to assist the Contractor in the preparation of the Contractor's Punch List. The Contractor's superintendent shall participate in the preparation of the Contractor's Punch List that is submitted to the Architect and shall personally inspect each and every item himself before certifying to the Architect that listed items have been corrected. Should the Architect determine that the Contractor's Punch List lacks sufficient detail or requires extensive supplementation, the Punch List will be returned to the Contractor for revision and the inspection for determining the Date of Substantial Completion will be delayed until the Punch List submitted is a reasonable representation of the work to be completed. To further facilitate completion of the Work the Contractor's superintendent shall accompany the Architect and his consultants during their inspections and the preparation of their supplements to the Punch List and the superintendent shall record or otherwise take note of those supplementary items. The Architect will endeavor to furnish to the Contractor typed, hand-lettered, written or recorded supplements to the Punch List in a prompt manner; however, any delay in the Contractor's receiving said supplements from the Architect shall not be cause for a claim for additional cost or extension of time as the Contractor's superintendent shall have been in attendance during the inspections of the Architect and his consultants and will have been expected to taken his own notes. Furthermore, a significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judges of what constitutes a significantly large number of items.

§ 9.8.3 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

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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.

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ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 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, form 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.

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(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 land 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.

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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.

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§ 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.

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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.

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

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.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.

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(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:
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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 is 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

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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."

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§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. ~~The Owner shall designate in writing a representative who shall have express~~ All parties understand that only the Board of Trustees for the Owner acting as a body corporate has the authority to bind the Owner with respect to all matters requiring the ~~Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority.~~ Board's approval under current policy of the Board of Trustees for the Owner, including, but not limited to, Change Orders. Except as otherwise provided in Section 4.2.1, the Architect does not have authority to bind the Owner with respect to matters requiring the Owner's approval or authorization. The term "Owner" means the Owner or the Owner's authorized representative.

~~**§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.**~~

§ 2.1.2 The Board of Trustees, by majority vote, is the only representative of the Owner, an independent school district, having the power to enter into a contract, to approve a Change Order requiring an increase in the Contract Sum, or agree to an extension to the contractual Completion Date, unless this authority is lawfully delegated. Neither Architect nor Contractor may reply upon the direction of any employee of Owner or Program Manager who has not been designated in writing by the Superintendent of Schools or Board of Trustees of Owner; Owner shall not be financially responsible for actions taken by the Architect or Contractor in reliance upon direction from unauthorized persons.

§ 2.1.3 The presence of the Owner, Program Manager or Architect at the Work site does not imply acceptance or approval of the Work.

§ 2.1.4 The Owner, being a public body under the laws of the State of Texas, must have funds in the full amount of the Contract on hand prior to award and execution of the Contract. Furthermore, no Contract exists between the Owner and the Contractor until the formation of the Contract is approved by a majority of the Board of Trustees of the Owner in open session at a duly held Board meeting, and the contract is signed by an authorized Owner's representative.

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§ 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 require 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.

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§ 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

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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'

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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.

...

§ 3.3.4 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

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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 RELASES, 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

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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.

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§ 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

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.5 The Contractor shall include in his base Proposal the permit fee required by Harris County. The Owner will be responsible for fees payable to the TDLR, any MUD and the Third-party plan reviewer.

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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

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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~~

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~~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

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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 ¼ 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

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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**

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ALLEGED TO HAVE BEEN CAUSED BY THE NEGLIGENCE, FAULT OR STRICT LIABILITY OF ANY OF THE INDEMNIFIED PARTIES.

FOR ALL CLAIMS NOT ADDRESSED IN THE ABOVE PARAGRAPH, CONTRACTOR SHALL INDEMNIFY, DEFEND AND HOLD HARMLESS THE OWNER AND ITS TRUSTEES, OFFICERS, AGENTS, AND EMPLOYEES AND (COLLECTIVELY, THE "INDEMNIFIED PARTIES"), FROM AND AGAINST ALL CLAIMS, LOSSES, EXPENSES, COSTS, DEMANDS, SUITS, CAUSES OF ACTION, AND DAMAGES, INCLUDING WITHOUT LIMITATION, ATTORNEYS' FEES AND EXPENSES, OF ANY NATURE WHATSOEVER ARISING OUT OF OR RELATED TO THIS AGREEMENT OR THE WORK TO BE PERFORMED UNDER THIS AGREEMENT, BUT ONLY TO THE EXTENT OF THE NEGLIGENCE OR OTHER FAULT OF THE CONTRACTOR, ITS AGENTS, REPRESENTATIVES, EMPLOYEES OR SUBCONTRACTORS OF ANY TIER.

§ 3.18.2 ~~In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.~~It is understood and agreed that Subparagraph 3.18 above is subject to, and expressly limited by, the terms and conditions of TEX. CIV. PRACT. & REM. CODE ANN. 130.001-130.005 (Vernon Supp. 1989), as amended or modified, or any successor statute. Contractor shall **not** be obligated under Subparagraph 3.18 to indemnify or hold harmless Program Manager, Architect or any agent, servant of employee of Architect from liability or damage that is caused by or results from:

.1 defects in plans, designs or specifications prepared, approved or used by the Architect; or

.2 negligence of the Architect in the rendition or conduct of professional duties called for or arising out of the Contract Documents and the plans, designs or specifications that are a part of the Contract Documents; and arises from:

.1 personal injury or death;

.2 property injury; or

.3 any other expense that arises from personal injury, death or property injury.

§ 3.18.3 It is agreed with respect to any legal limitations, now or hereafter in effect and affecting the validity or enforceability of the indemnification obligation under Paragraph 3.18, such legal limitations are made a part of the indemnification obligation and shall operate to amend the indemnification obligation to the minimum extent necessary to bring the provision into conformity with the requirements of such limitations, and as so modified, the indemnification obligation shall continue in full force and effect.

§ 3.19 Record Drawings

§ 3.19.1 Refer Owner's Closeout Procedures

§ 3.20 Prevailing Wage Rates

§ 3.20.1 As required by Chapter 2258 of the Texas Government Code Title 10 Prevailing Wage Rate, no employee used in this construction may be paid less than the minimum prevailing wage rate in effect for the Owner.

§ 3.20.2 The Contractor and each Subcontractor and Sub-subcontractor shall pay to all laborers, workmen, and mechanics employed in execution of this Contract not less than rates set forth by law for each craft of type of workman or mechanic needed to execute this Contract.

§ 3.20.3 Determination of prevailing wages shall not be construed to prohibit payment of more than the rates identified.

§ 3.21 Antitrust Violations

§ 3.21.1 Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1 et.seq. (1973). The Contractor shall include this provision in his contracts with each Subcontractor and Supplier. Each Subcontractor shall include such provision in contracts with Sub-subcontractors and suppliers.

§ 3.22 Third-Party Beneficiary

§ 3.22.1 No person or entity shall be deemed to be a third-party beneficiary of any provision(s) of this Contract; nor

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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

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give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of ~~the Work.~~
the Work, except when the Contractor's inability to perform the Work is a result of design flaw, error or omission.

...

§ 4.2.8.1 Allowance Expenditure will be authorized using Allowance Expenditure authorizations (AEA) executed by the Owner, the Architect and the Contractor. All Allowance Expenditure Authorizations will be incorporated into the contract by Change Order at the completion of the project. Work authorized by an AEA may be invoiced as it is completed.

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§ 4.2.13 ~~The Architect's~~ All decisions on matters relating to aesthetic effect ~~will be final if consistent with the intent expressed in the Contract Documents.~~shall initially be made by the Architect; however, all such decisions are subject to the Owner's written approval.

...

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor. Wherever relevant, the term "Subcontractor" shall also include a person, or entity who supplies material or equipment for the Project.
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§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution. Prior to such change the Contractor shall notify the Architect of his intent and reasons for such proposed change**§ 5.2.5** The Contractor shall submit the list of proposed Subcontractors on AIA Document G805. The Contractor may obtain blank copies from the Architect.

§ 5.2.6 Contractor shall promptly notify the Owner, Architect and Program Manager of any material defaults by any subcontractor.

...

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the ~~subcontract.~~subcontract, but only to the extent permitted by law.

...

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. ~~If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.~~

...

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate ~~agreements.~~ agreements The Owner reserves the right to perform ~~construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.~~other construction work, maintenance and repair work and school program operations at the site and near the site during the time period of the Work. Owner may perform other Work with separate Contractors or forces. Owner shall have access to the building on the site at all times..

...

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~~§ 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

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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 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.

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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
~~§ 8.2 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.

...

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~~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

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Certified Applications for Payment from the Architect shall not be construed as receipt of an invoice by the Owner. Contractor further agrees that Program Manager's receipt of the Certificate of Payment shall be construed as receipt of an invoice by the Owner, for purposes of Texas Government Code Section 2251.042

§ 9.3.2 ~~Unless otherwise provided in the Contract Documents, payments shall~~ Payments will be made on account of materials ~~and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and~~ or equipment 1) incorporated in the Work; 2) suitably stored at the site; or 3) suitably stored at some off-site location, provided the following conditions are met for off-site storage:

.1 The location must be agreed to, in writing, by the Owner and Surety.

.2 The location must be a bonded warehouse.

.3 Surety must agree, in writing, to each request for payment.

.4 The Contractor must bear the cost of the Owner's and Architect's expenses related to visiting the offsite storage area for confirmation.

Payments for materials or equipment stored on or off the site shall be conditioned upon ~~compliance by the Contractor with~~ submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials ~~and~~ or equipment or otherwise protect the Owner's interest, ~~and shall include the costs of applicable insurance, storage, and transportation to the site, for such~~ including applicable insurance (naming the Owner as insured) and transportation to the site for those materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payments, deposits, or other advance payments for materials or equipment.

The Contractor acknowledges that the review of materials and/or equipment stored off the side is an additional service of the Architect, and the Contractor shall be charged for that service. The cost for such service will be established by the Architect and is not subject to appeal.

...

§ 9.3.4 The Contractor shall submit requests for payment in duplicate, using AIA Document G702, Application and Certificate of Payment, as the cover sheet. Continuation sheets showing in detail the amounts requested, etc., shall be submitted using AIA Document G703, Continuation Sheet, or a computerized version of these documents previously approved for use. The information provided on the continuation sheets in the Description of the Work and Scheduled Values columns shall match the corresponding information shown on the approved Schedule of Values. All blank spaces on AIA Document G702, Application and Certificate of Payment, must be completed and the signatures of the Contractor and Notary Public shall be original on each form. By submitting his application for payment, the Contractor certifies that the individual signing the application is authorized to do so.

§ 9.3.5 The Contractor shall submit the Fort Bend ISD Subcontractor Progress Assessment Form with each application for payment requesting payment be made for Work performed by a subcontractor that qualifies as a "small business" pursuant to FBISD Board Policy CV (Local). The Contractor shall also ensure that, once Contractor makes the applicable payment to the Small Business Subcontractor, the Subcontractor completes the Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form in its entirety and Contractor agrees to submit the completed copies to Owner with the next application for payment. The completed Fort Bend ISD Subcontractors/Subcontractors/Suppliers Payment Certification Form must be received by the Owner before any further payment will be made to Contractor for any Work performed.

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§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect and Program Manager to the Owner, based on the Architect's and Program Manager's evaluation of the Work and the data ~~in the Application for Payment,~~ comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's ~~knowledge, information, and belief, the Work has progressed to the point indicated, the~~ and Program Manager's knowledge, information and belief, the quality of the Work is in accordance with the Contract ~~Documents, and that the Contractor is entitled to payment in the amount certified.~~ Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, ~~to~~ the results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to ~~completion,~~ completion and to specific qualifications expressed by the ~~Architect.~~

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~~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~~ field or reasonable evidence indicating probable filing of such ~~claims,~~ claims unless security acceptable to the Owner is provided by the Contractor;

~~.3 failure~~ 3. Failure of the Contractor to make payments properly to Subcontractors or ~~suppliers~~ for labor, materials or equipment;

~~.4 reasonable~~ 4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

~~.5 damage~~ 5. Damage to the Owner or ~~a Separate Contractor;~~another contractor;

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

~~.7 repeated~~ 7. Persistent failure to carry out the Work in accordance with ~~the Contract Documents.~~ the Contract Documents; or

8. Failure to submit a written plan indicating action by the Contractor to regain the time schedule for completion of Work within the Contract Time

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§ 9.5.5 If the work has not attained Substantial Completion by the date agreed upon and set forth in the Amendments, subject to extensions of time as described in the Contract Documents, Owner may, in sole discretion, direct Architect or Program Manager to withhold payment to Contractor to the extent necessary to reserve sufficient funds to complete the construction of the Project and to cover liquidated damages assessed against Contractor up to the time of the Application for Payment and to the time it is reasonably anticipated Substantial Completion will be achieved. The Owner shall not be deemed in default by reason of withholding payment as provided for in Sections 9.3.4, 9.4.3, 9.5.1, or this Section.

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make ~~payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.~~progress payments in accordance with the following Section which shall be inserted as Article 5, Progress Payments, in the Owner-Contractor Agreement, AIA Document A101, 2017 Edition.

.1 Based upon the applications for payment and supporting documents submitted to the Architect by the Contractor and certification of the amount payable by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided in the Contract Documents for the period ending the last day of the month as follows:

.2 Not later than twenty (20) working days following the first Wednesday of each month, ninety-five percent (95%) of the portion of the Contract Sum properly allocable to labor, materials, and equipment incorporated in the Work and ninety-five percent (95%) of the portion of the Contract Sum properly

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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

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Contractor's superintendent shall accompany the Architect and his consultants during their inspections and the preparation of their supplements to the Punch List and the superintendent shall record or otherwise take note of those supplementary items. The Architect will endeavor to furnish to the Contractor typed, hand-lettered, written or recorded supplements to the Punch List in a prompt manner; however, any delay in the Contractor's receiving said supplements from the Architect shall not be cause for a claim for additional cost or extension of time as the Contractor's superintendent shall have been in attendance during the inspections of the Architect and his consultants and will have been expected to taken his own notes. Furthermore, a significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judges of what constitutes a significantly large number of items.

...

§ 9.8.6 In order for the project or a major portion thereof to be considered substantially complete, the following conditions must be met:

.1 All inspections by governmental authorities having jurisdiction over the project must have been finalized, any remedial work required by those authorities must have been completed, and Certificates of Occupancy and similar governmental approval forms must have been issued and copies delivered to the Owner and Architect.

.2 All work, both interior and exterior, shall have been completed and cleaned except minor items which if completed after occupancy, will not, in the Owner's opinion, cause interference to the Owner's use of the building or any portion thereof. A significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judge of what constitutes a significantly large number of items.

The following items are a partial specific list of requirements, as applicable to the Project, that must be completed **prior** to established Substantial Completion of all portions of the work (Including the Substantial Completion of the commissioning phase).

1. All fire alarm system components must be completed and demonstrated to the Owner.
2. Local fire marshal approval certificate, or similar Certificate of Occupancy from the governing agency, must be delivered to the Owner.
3. All exterior clean-up and landscaping must be complete.
4. All final interior clean-up must be complete.
5. All HVAC air and water balancing must be complete.
6. All required commissioning must be complete.
7. All Energy Management Systems must be complete and fully operational and demonstrated to the Owner.
8. All communications equipment, telephone system, and P.A. systems must be complete and demonstrated to the Owner.
9. All final lockset cores must be installed and all final Owner directed keying completed.
10. All room plaques and exterior signage must be completed.
11. All Owner demonstrations must be completed including kitchen equipment, HVAC equipment, plumbing equipment, and electrical equipment.
12. A final certificate of occupancy must be signed by the Contractor and delivered to the Owner.

§ 9.8.7 After the date of Substantial Completion of the Project, as evidenced by the Certificate of Substantial Completion, G704 current edition, the Contractor will be allowed a period of thirty (30) days (unless extended by mutual agreement or provision of the Contract) within which to correct all deficiencies attached to the Certificate of Substantial Completion. Failure of the Contractor to complete such corrections within the stipulated time will be reported to the Contractor's Surety. In the report of deficiency, the Contractor and Surety will be informed that, should correction remain incomplete for fifteen (15) additional days, the Owner may initiate action to complete corrective work out of the remaining Contract funds in accordance with Section 14.2. Additional costs of the Owner, Architect, and other consultants incurred because of the Contractor's failure to complete the correction of deficiencies within thirty (30) days after the date of Substantial Completion (unless extended by mutual agreement or provision of the Contract) may be deducted from the funds remaining to be paid to the Contractor. Should corrective work following Substantial Completion require more than one reinspection after notification by the Contractor that corrections are complete, the cost of subsequent inspections may also be deducted from funds remaining unpaid to the Contractor.

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§ 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~~ 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.~~

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§ 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.

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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, form the obligation to provide for the safety of their employees, persons and property and their requirements to maintain a work environment free of recognized hazards.

§ 10.1.2 Contractor's employees, agents, Subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, shall not perform any service for Owner while under the influence of any amount of alcohol or any controlled substance, or use, posses, distribute, or sell alcoholic beverages while on Owner's premises. No person shall use, possess, distribute, or sell illicit or unprescribed controlled drugs or drug paraphernalia; misuse legitimate prescription drugs; or act in contravention of warnings on medications while performing the Work or on Owner's premises.

§ 10.1.3 Contractor has implemented it's own Safety Manual to assure a drug-free and alcohol-free workplace while on Owner's premises or performing the Work. Contractor will remove any of its employees, agents, subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, from performing the Work any time there is suspicion of alcohol and/or drug use, possession, or impairment involving such person, and at any time an accident occurs where drug or alcohol use could have been a contributing factor, Owner has the right to require Contractor to remove any person from performing the Work any time cause exists to suspect alcohol or drug use. In such cases, the person so removed may only be considered for return to work after the Contractor certifies as a result of a for-cause test, conducted immediately following removal that said person was in compliance with this Contract. Contractor will not use any person to perform the Work who fails or refuses to take, or tests positive on, any alcohol or drug test.

§ 10.1.4 Contractor will comply with all applicable federal, state and local drug and alcohol-related laws and regulations (e.g., Department of Transportation regulations, Drug-Free Workplace Act). Owner has also banned the presence of all weapons on the Project site, whether or not the owner thereof has a permit for a concealed weapon, and the Contractor agrees that the Contractor's representative, employees, agents, and sub-contractors will abide by the same.

...

§ 10.2.3 The Contractor shall ~~implement, erect,~~ erect and maintain, as required by existing conditions and performance of the Contract, reasonable ~~safeguards~~ safeguards, for safety and protection, including posting danger signs and other warnings against ~~hazards;~~ hazards, promulgating safety ~~regulations;~~ regulations and notifying ~~the~~ owners and users of adjacent sites ~~and utilities of the safeguards.~~and utilities. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements therein. Any damage to such property for improvements shall be promptly repaired by the Contractor. Contractor shall provide reasonable fall protection safeguards and provide approved fall protection safety equipment for use by all exposed Contractor employees.

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§ 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.

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§ 10.3.1.1 Owner and Contractor may enter into a separate agreement and/or Change Order for Contractor to remediate and/or render harmless the Hazardous Substance, but Contractor shall not be required to remediate and/or render harmless the Hazardous Substance absent such agreement. Contractor shall not be required to resume work in any area affected by the Hazardous Substance until such time as the Hazardous Substance has been remediated and/or rendered harmless.

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~~**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.~~

~~**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.~~

~~**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.~~

~~**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.~~

§ 10.3.7 As part of the construction contract close out process, and prior to receiving payment of any of the retainage, the Contractor and his subcontractors shall submit notarized statements pertaining to the above referenced hazardous materials.

...

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

~~**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.~~

~~**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.~~

~~**§ 11.1.3** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.~~

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~~**§ 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 land 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

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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.

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§ 11.5.12 The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor which entitles the governmental entity to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the governmental entity.

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The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense. The Owner may make emergency repairs to the Work or take such other measures necessary under the circumstance, if the Contractor does not promptly respond to a Notice of Defect or nonconforming Work. Contractor shall be responsible to Owner for this cost if the reason for the repairs is attributable to the Contractor. If payments then or thereafter due to the Contractor are not sufficient to cover such costs, then the Contractor shall pay the difference to the Owner on demand.

§ 12.2.1.1 In the event of failure of a specified project, either during construction or the correction period, the Contractor shall take appropriate measures with the manufacturer of the product to assure correction or replacement of the defective products.

§ 12.2.1.2 Refer to 01 77 00, Closeout Procedures in Division One for further terms regarding warranties which will be required prior to final payment.

§ 12.2.1 ~~In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.~~Approximately eleven months after substantial completion, the contractor shall accompany the Owner and Architect on an "end of the one year correction period" reinspection of the Project. Additional deficiencies observed or reported shall be corrected by the Contractor.

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~~If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.~~**§ 12.3.1** If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

§ 12.3.2 The Owner's use and/or occupancy of any or all of the Project site shall never be construed as an acceptance of Work not in conformance with Contract Documents. The Owner reserves the right to enforce provisions of the Contract unless the Owner's acceptance is provided to the Contractor in writing.

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§ 13.7 Equal Opportunity

§ 13.7.1 The contractor shall maintain policies of employment as follows:

.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during

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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.~~

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...

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party ~~under this Section 15.1.3.1 shall~~ must be initiated within ~~21~~ ninety (90) days after occurrence of the event giving rise to such Claim or within ~~21~~ ninety (90) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Contractor agrees that this is a reasonable Notice requirement. Any Claim or portion of a Claim that has not been made the specific subject of a Notice strictly in accordance with the requirements of this section is waived.

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§ 15.1.6.2 ~~If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.~~**No extensions of the Contract Time will be granted for inclement weather, except as stated in Section 8.3.1.**

~~:~~

~~**§ 15.1.7 Waiver of Claims for Consequential Damages**~~

~~The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes~~

~~.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and~~

~~.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.~~

~~This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.~~

§ 15.2.1 Claims, excluding those ~~where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5,~~ arising under Sections 11.3.9 and 11.3.10, or claims alleging an error or omission by the Architect, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. ~~Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.~~If the parties are unable to agree, any claim, dispute or matters arising out of the contract between the Architect, Owner and Contractor or any combination of those parties shall be submitted to a court of appropriate jurisdiction.

...

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the ~~Initial~~ initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons ~~therefor;~~ therefore; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the ~~parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.~~parties, but subject to mediation, if both parties so agree, and subject to legal or equitable

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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~~ of 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.~~

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~~**§ 15.4.3** The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

~~**§ 15.4.4 Consolidation or Joinder**~~

~~**§ 15.4.4.1** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~

~~**§ 15.4.4.2** Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.~~

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.~~

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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)

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CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

SECTION 01 14 13 CONTRACTOR INDENTIFICATION

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.

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 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 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 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 education Code 22.085
   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.

B. 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.

6.5 All badges that are lost, stolen, or otherwise unaccounted for must be immediately reported to the District

6.6 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.

6.7 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

8.1 Contractors that require keys to perform work at the project site shall coordinate with the individual campus.

8.2 Keys should never be issued to Contractors / Sub Contractors.

A. District staff will provide access when necessary.

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 _____

SECTION 01 21 00 ALLOWANCES

PART 1 - GENERAL

ALL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Selected materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued.

1.03 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise the Architect of the date when the final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At the Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the Architect from the designated supplier.

1.04 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.05 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect and Owner for the Owner's purposes and only by Contingency Allowance Expenditure Authorization that indicate amounts to be charged to the allowance.

B. Contingency Allowance Expenditure Authorizations authorizing use of funds from the betterment and contingency allowance will include Contractor's related material and labor costs. Overhead and profit for betterment and contingency allowances is included in contract sum and therefore contractor overhead and profit shall not be added to cost amounts charged to this allowance.

C. At Project closeout, credit 100% unused amounts remaining in the betterment and contingency allowance to the Owner by Change Order.

1.06 STIPULATED SUM ALLOWANCES

A. Use the stipulated sum allowance for the purchase of materials, labor, installation, overhead and profit to be included in the contract sum. Any difference in cost and allowance will be returned to the Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine products covered by an allowance promptly upon delivery for damage or defects.

3.02 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.

3.03 SCHEDULE OF ALLOWANCES:

A. **Allowance No. 1:** Include a Contingency Allowance for use at the owner's discretion.
Amount of Allowance: $250,000.00

B. **Allowance No. 2:** Include a Contingency Allowance for Unforeseen Conditions.
Amount of Allowance: $250,000.00

END OF SECTION 01 21 00

SECTION 01 23 00 ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. ALTERNATE NO. 1
1. Base Bid Adjustment

B. ALTERNATE NO.2
1. Deviations Request Form

C. ALTERNATE NO.3
1. Dulles High school detention below Softball and Baseball Turf Field: Ref Drawings
This Alternate provides for the substitution of an underground detention system beneath the baseball and softball fields in lieu of the originally designed on-site surface detention basin at the practice field. The underground system preserves the playing surfaces of the practice, baseball, and softball fields for athletic use while maintaining the required stormwater detention volume of 3.87 acre-feet (AC-FT).

2. Underground Detention System (Add)
Install underground detention 3.87 AC-FT Under the Fields: REF CIVIL Drawings CS 2.11.

3. Deleted Surface Detention (Deduct)
Surface Detention on Practice Field for 3.87 AC-FT.

D. ALTERNATE NO.4
1. Provide a monofilament synthetic turf system in lieu of the monofilament/slit-film blend system specified under the Base Bid. The alternate turf shall meet or exceed the performance and quality requirements outlined in Section 32 18 23.1 REF to drawings for field locations and installation details.

E. ALTERNATE NO.5
1. All Fields to receive new Foul Poles
2. Description:
a. Provide new foul poles at all baseball and softball fields. Each field shall receive two (2) foul poles.

F. ALTERNATE NO.6
1. Electrical upgrades and Glue down Turf for all Ten Dugouts
2. Description:
a. Provide power and lighting systems for all dugouts in the scope which includes ten (10) Dugouts for Softball and ten (10) Dugout for Baseball

b. Install glue-down synthetic turf finish in each dugout over self-leveling compound substrate. REF Section 32 18 20

G. ALTERNATE NO.7

1. All Existing Outfield fences to receive Paint, depending upon existing material for the outfield, if it is Chain link fence provide galvanized finish, if it is wood fence sand and prep and provide new paint.

   a. For chain link fences, prepare existing surfaces and provide a new galvanized finish. REF: Section 32 31 15

   b. For wood outfield fences, clean, sand, prepare all exposed surfaces and provide a new paint finish REF Section 09 90 00

   c. Contractor shall verify existing fence types, conditions, and extents in the field and refer to drawings for additional information on existing configurations and limits of work.
      1. The following fields have chain link outfield fences
         a. Austin Softball
         b. Dulles Softball
         c. Elkins Softball
         d. Elkins Baseball
         e. Kempner Softball
         f. Willowridge Softball
         g. Willowridge Baseball

      2. The following Schools have a combination of both Chain link and Wood Outfield Fence
         a. Austin Baseball
         b. Dulles Baseball
         c. Kempner Baseball

END OF SECTION 01 23 00

SECTION 01 25 00 SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
4. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor and Owner.

1.4 SUBMITTALS

A. Substitution Requests: 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.

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

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

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.
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: Carolina Fuzetti – Executive Director Design and Construction 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 #	

Contractor's Certification:
In the Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to or better than the work required by the Contract Documents, and it will perform adequately in the application indicated. The Contractor waives the rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.

_____

_____

General Contractor's or Representative Signature Date

	APPROVED	REJECTED	DATE	REASON
A/E's Recommendation (within 2 wks. of receipt)				
FBISD Facilities Recommendation				

Pending Information Noted below:

Final Response to Substitution Request: _____ Approved _____ Not Approved

_____

District Representative Date

_____

Project Manager Date

_____

Design Manager Date

Refer to Specifications Section 01 60 00 for additional provisions and GC Agreement 3.4.2.1 and 3.5.1.

A/E, PM and/or District are not authorized to waive any code requirements. If the Request is approved, when signed by the District and Project Manager and received by the Contractor, this document becomes effective immediately as a FBISD Approved substitution and the GC Firm shall proceed with the change(s) described above. If the Request is not approved, no changes can be implemented

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

SECTION 01 26 00 CONTRACT MODIFICATIONS

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.

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.

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

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

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 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

SECTION 01 29 73 SCHEDULE OF VALUES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Provisions established within the General, Supplementary and Other Conditions of the Contract, Division 01 – General Requirements, and the Drawings are collectively applicable to this Section.

1.2 REQUIREMENTS INCLUDED

A. Procedures for preparation and submittal of Schedule of Values (SOV).

1.3 RELATED SECTIONS/DOCUMENTS

A. General Conditions.
B. Section 01 29 00 – Payment Procedures.

1.4 FORMAT

A. Print SOV on AIA Documents G703 – Continuation Sheet for Application and Certificate for Payment.
B. Follow Table of Contents of Project Manual for listing components parts. Identify each line item by number and title of major Specifications Section.

1.5 CONTENT

A. Using the current Master Format™ Edition, in CSI format, each school shall have a separate SOV for Renovation Work and for Addition Work, as applicable.
B. In CSI format, list installed value of each major item of Work to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar. All values should be taken to the Dollar.
C. List Owner Controlled Contingency Allowance and other allowances with the specified monetary amount for each allowance in separate divisions.
D. Contractor to use separate lines for bonds, insurance, temporary facilities and controls, superintendents, mobilization, and demobilization. Each item shall include prorated portion of overhead and profit.
E. Provide line item for safety on the SOV.
F. Provide line item for closeout on the SOV.
G. The sum of the values listed shall equal total Contract Sum.

1.6 SUBMITTAL

A. GC prepares and submits a SOV timely prior to the submittal of the first pay application and that the A/E and PMT reviews and responds prior to the approval of the first pay application.
B. Upon resolution of issues, the PM is responsible for providing a letter accepting the SOV.
C. Payment against the approved SOV is based on earned value which is derived from the status of the construction as observed by the A/E and PM.
D. Submit a copy via Kahua transmittal of the SOV within ten (10) days of award of contract and prior to Pre-Construction Meeting or first pay application.
E. Identify Project by title and number.
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

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.

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.
   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

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.
    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, 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.

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.
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.

End of Section 01 31 00

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.
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 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.
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

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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: _____

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.

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

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

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 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 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 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.
   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 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.
   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 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

SECTION 01 32 33 PHOTOGRPAHIC 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.
      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

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.

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.

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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

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 calendars days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 calendar days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

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

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.
        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.

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.

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.

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 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, 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

SECTION 01 35 23 PRODUCT 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 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 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 287.1-1968.
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 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.
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 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 40 00 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control. 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.

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.
    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.
   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 p roduction 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 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.
         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 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

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.

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 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

SECTION 01 45 40 TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes testing laboratory services and Contractor responsibilities related to those services.

1.2 REFERENCES

A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D 3666 - Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials.

C. ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

D. ASTM E 329 - Standard Specification for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.

E. ISO/TEC Guide 25 - General Requirements for the Competence of Calibration and Testing Laboratories.

1.3 SELECTION AND PAYMENT

A. The Owner will select, employ, and pay for services of an independent testing laboratory to perform inspection and testing identified in Part 3 of individual Specification sections.

B. Contractor shall employ and pay for services of an independent testing laboratory or laboratories to perform inspection and testing identified in Part 2 of individual Specification sections.

C. Employment of a testing laboratory by the Owner shall not relieve Contractor of its obligation to perform work in accordance with requirements of Contract documents.

D. The Owner will deduct a minimum two-hour charge for testing laboratory time from periodic progress payment when operations requiring testing or inspection are canceled without prior notification.

E. The Owner will deduct cost of retesting from periodic progress payment whenever failed work is removed, replaced and retested.

1.4 QUALIFICATION OF LABORATORY

A. Meet laboratory requirements of ASTM E 329 and applicable requirements of ASTM C 1077, ASTM D 3666, and ASTM D 3740.

B. Meet ISO/TEC Guide 17025 conditions for accreditation by the American Association for Laboratory Accreditation (A2LA) in specific fields of testing required in individual Specification sections.

C. If laboratory subcontracts are part of the testing services, such work will be placed with a laboratory complying with the requirements of this Section.

1.5 LABORATORY REPORTS

A. Testing laboratory shall provide and distribute copies of laboratory reports to the distribution list the Owner's Representative provides at the pre-construction conference.

B. Keep one copy of each laboratory report distributed or faxed at the site field office for duration of the Work.

C. Laboratory will fax material supplier, Contractor and the Owner's Representative reports that indicate failing test results by no later than close of business on the working day following test completion and review.

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge requirements of the Contract.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume Contractor duties.

D. Laboratory has no authority to stop the Work.

1.7 CONTRACTOR RESPONSIBILITIES

A. Provide safe access to the Work and to manufacturer's facilities for the Owner's Representative and for testing laboratory personnel.

B. Provide testing laboratory with a copy of the Construction Schedule and a copy of each update to Construction Schedule.

C. Notify the Owner's Representative and testing laboratory during normal working hours of the day previous to expected time for operations requiring inspection and testing services. When Contractor fails to make timely prior notification, do not proceed with the operations requiring inspection and testing services.

D. Notify Design Consultant 24 hours in advance when Specification requires presence of Design Consultant for sampling or testing.

E. Request and monitor testing as required to provide timely results and to avoid delays to the Work. Provide samples to laboratory in sufficient time to allow required test to be performed in accordance with specified test methods before intended use of the product.

F. Cooperate with laboratory personnel in collecting samples on site. Provide incidental labor and facilities for safe access to the Work to be tested, to obtain and handle samples at site or at source of Products to be tested, and to facilitate tests and inspections including storage and curing of test samples.

G. Make arrangements with laboratory through the Owner's Representative. Payment for additional testing will be made in accordance with the General Conditions:
   1. Re-testing required for failed tests.
   2. Re-testing for nonconforming work.
   3. Additional sampling and tests requested beyond specified requirements.
   4. Insufficient notification of cancellation of tests for work scheduled but not performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

3.01 CONDUCTING TESTING

A. Conform to laboratory sampling and testing methods specified in individual Specification sections, to the latest issues of ASTM standards, TXDoT methods, or other recognized test standards as approved by the Owner's Representative.

B. Requirements of this Section shall also apply to those tests for approval of materials, for mix designs, and for quality control of materials as performed by employed testing laboratories.

END OF SECTION 01 45 40

SECTION 01 45 23.02 TESTING AND INSPECTION SERVICES

PART A – 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 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.
    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.

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.
    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 25 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.

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.

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

SECTION 01 45 23 MATERIALS TESTING

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall provide such equipment and facilities as are required for conducting field tests and for collecting and forwarding samples. No materials or equipment represented by samples are to be used until test, if required, have been made and the materials or equipment are found to be acceptable. Any product which becomes unfit for use after approval thereof shall not be incorporated into the work

1.2 OWN ER'S RESPONSIBILITIES

A. Owner will provide any inspection and testing services not provided by the contractor as required by the Contract Documents.

B. Testing:
   1. Tests will be made by an accredited testing laboratory selected by Owner.
   2. Except as otherwise provided, sampling and testing of all materials and the laboratory methods and testing equipment will be in accordance with the latest standards and methods of the ASTM and the AASHTO.

C. Owner will be responsible for and will pay costs in connection with the following testing of materials in place:
   1. Soils compaction.
   2. Trench backfill.
   3. Pipe and structural bedding.
   4. Concrete.
   5. Pavement.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall provide, at contractor's expense, the testing and inspection services required by the contract documents.

B. Contractor shall be responsible for and shall pay all costs in connection with testing required for the following materials:
   1. Concrete manholes
   2. Concrete materials and mix designs.
   3. Design of asphalt mixtures.
   4. Gradation for embedment, fill, and backfill materials.
   5. All performance and field testing such as: Mira Testing attached to this sheet.

C. Retesting for work or materials found defective or unsatisfactory, including tests covered in section above entitled "Owner's Responsibilities".

1.4 SUBMITTALS

A. Need to submit the following items:
   1. Need 2lbs stone sample.
   2. Need small 12"x12" turf sample with data.
   3. Perforated, solid pipe, fittings (data).
   4. Junction box data.
   5. Wood nailer data.

B. Written reports of test and engineering data furnished by contractor for engineer's review of materials and equipment proposed to be used in the work shall be submitted as specified on shop drawings.

C. The testing laboratory retained by Owner will furnish three (3) copies of a written report of each test performed by laboratory personnel in the field or laboratory.
   1. Two (2) copies of each test report will be transmitted to engineer and one (1) copy to contractor within ten (10) days after each test is completed.

1.5 INSPECTION AND TESTING

A. General:
   1. Owner, through its engineer will inspect the work as the work progresses.
   2. The purpose of the inspection activity is to determine on an on-going basis whether or not contractor's work is adequate to provide the product as well as the quality of product for owner.
   3. Work will be compared to drawings and specifications to determine whether work is defective. Should the appearance and performance of any element of the work fail to conform to standards of the trade for such work, that work may be declared defective.
   4. All materials and equipment used in the construction of the project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the contract documents.
   5. Where additional or specific information concerning testing methods, sample sizes, etc., is required, such information is included under the applicable sections of the specifications. any modification of, or elaboration on, these test procedures which may be included for specific materials under their respective sections in the specifications shall take precedence over the procedures contained within this specification.

B. Correction of work:
   1. Should the WORK fail to meet the requirements of any specification, as determined by testing performed by owner, contractor shall take steps to meet the requirements and owner will then retest to determine compliance with the specifications.
   2. Contractor shall be responsible for the cost of the retest and such cost shall be deducted from progress payment to contractor.
   3. Contractor shall promptly remove from the premises all work rejected by engineer or owner for failure to comply with the contract documents.

1.6 TESTING:

A. Permeable Rock Stone:
   1. Density Test D2922 (Nuclear Method).
   2. Permeability Test (ASTM D3385).
   3. Compaction D698.

B. Subgrade:
   1. Density Test D2922.
   2. Compaction D698.
   3. Liquid Limit - ASTM D4318.
   4. Plastic Limit and Plasticity Index ASTM.

C. Turf:
   1. Gmax per ASTM F1936 - Impact Attenuation Test.

D. Pipe:
   1. Inspection of bedding and backfill, pipe, joints and thrust blocks.

END OF SECTION 01 45 23

SECTION 01 45 29 STRUCTURAL TESTING AND INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for quality assurance and quality control to be completed by the Testing Laboratory, Contractor, and/or the Geotechnical Engineer for the following structural items:
   1. Concrete Forming and Accessories.
   2. Concrete Reinforcing.
   3. Cast-in-Place Concrete.
   4. Masonry
   5. Structural Steel.
   6. Steel Joists.
   7. Steel Decking.
   8. Earthwork.

B. Related Requirements:
   1. Specification 01 40 00 "Quality Requirements" for other independent testing agency procedures and administrative requirements.

1.3 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:
   1. Cost Proposal: The Testing Laboratory's proposal to the Owner shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total estimated price shall also be submitted.

B. Measurement and Payment
   1. Confirm language in following paragraph with Architect.
   2. Payment of the Testing Laboratory: The Owner will pay for the initial Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
   3. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
   4. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable to the Owner for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
   5. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:
   6. Soil survey of the location of borrow soil materials, samples of existing soil materials, and delivery to the Contractor's Testing Laboratory.
      a. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
      b. Concrete mix designs as prepared by his concrete supplier.
      c. Site-situated storage boxes for concrete cylinders

d. Concrete coring, tests of below strength concrete, and load tests, if ordered by the Owner, Architect, or Engineer.
e. Certification of reinforcing steel steel mill order.
f. Certification of structural steel mill order.
g. Certification of portland cement, lime, fly ash.
h. Certification of welders and preparation of Welding Procedure Specifications.
i. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the Owner, Architect or Engineer to establish equality with specified items.
j. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or the time spent evaluating the in situ strength of concrete using the Maturity Method.
k. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.

7. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, Owner, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the Owner, Architect, or Engineer deem advisable to determine its proper construction. The Owner shall pay all costs if the tests prove the questioned work to be satisfactory.

1.4 OWNER RESPONSIBILITIES

A. The Owner shall engage a Geotechnical Engineer to provide inspection services for the foundations as outlined below in Article 3.9.

B. The Owner shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any preinstallation meetings.

1.5 CONTRACTOR RESPONSIBILITIES

A. The Contractor shall not engage the same Testing Laboratory for construction services as the Owner has for Structural Testing Laboratory Services as defined herein unless agreed to by the Owner.

B. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.

C. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

1.6 TESTING LABORATORY RESPONSIBILITIES

A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.

B. The Testing Laboratory shall serve as a Special Inspector to provide Special Inspection services for the items listed below. The scope of such services for each item shall be as defined in the Building Code or as defined in the local building code of the jurisdiction wherein the project is located. These inspections are mandatory for conformance to the legal requirements of the building code and shall be in addition to the inspections and tests otherwise defined in this specification.

1. Special Inspector Responsibilities:

a. The special inspector shall observe the work assigned to ascertain that, to the best of his/her knowledge, it is in conformance with the approved design drawings and specifications.
b. The special inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.
c. The special inspector shall create and maintain a log of all discrepancies throughout the duration of the Project. This log shall include, but is not limited to, discrepancy date, description of discrepancy, drawing and/or detail reference, description of as-built condition, description of any remedial work performed, and status of discrepancy. This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below.
d. The special inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.Retain paragraph below for all projects.

C. The Testing Laboratory shall provide inspections on the following items:
1. Reinforcing steel placement.
2. Concrete work.
3. Welding of reinforcing steel.
4. Bolts to be installed in concrete.
5. Bolts, anchors, and reinforcing bars installed in hardened concrete (post-installed anchors).
6. Inspection of structural steel, bolting, and welding material.
7. Welding of structural steel.
8. High-strength bolting.
9. Compacted earth fill.
10. Pier foundations.
11. Masonry work.

D. Notification of Deficiencies in the Work: The Testing Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing.

E. Accounting: The Testing Laboratory shall be responsible for separating and billing costs attributed to the Owner and costs attributed to the Contractor.

F. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the Owner, Architect, and Engineer when those submittals are not made in a timely manner.

G. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept any portion of the work or to perform any duties of the General Contractor and his Subcontractors.

1.7 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. The Testing Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
3. Notification of Source Change: The Contractor shall be responsible for notifying the Owner, Architect, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.

B. Preinstallation Meetings: The Testing Laboratory shall attend preinstallation meetings with the Architect, Engineer, Contractor, and material suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such meetings throughout the course of the project.

C. Scheduling:

1. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.

1.8 SUBMITTALS

A. Quality Control Reports:

1. Information on Reports: The Testing Laboratory shall submit copies of reports of inspections and tests promptly. The reports shall contain at least the following information:
   a. Project name.
   b. Date report issued.
   c. Testing Laboratory name and address.
   d. Name and signature of inspector/technician.
   e. Date of inspection and/or sampling.
   f. Date of test.
   g. Identification of product and Specification section.
   h. Location in the project.
   i. Identification of inspection or test.
   j. Record of weather conditions and temperature (if applicable).
   k. Results of test regarding compliance with Contract Documents.
2. Copies: The Laboratory shall electronically distribute PDF copies of test and inspection reports to individuals and/or to project websites, as designated by the Owner or Architect.

B. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.

1. Information on Log: This log shall include, but is not limited to:
   a. Discrepancy date.
   b. Description of discrepancy.
   c. Drawing and/or detail reference.
   d. Description of as-built condition.
   e. Description of any remedial work performed.
   f. Status of discrepancy.
2. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall

be submitted in its entirety as an attachment to the final signed report described below under Certifications.

C. Certification: Upon completion of the job, the Laboratory shall furnish to the Owner, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

1.9 QUALITY ASSURANCE

A. Qualifications of Special Inspector: The special inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.

B. Qualifications of Testing Laboratory:
1. The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the Owner, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
2. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
3. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
4. Qualifications of Welding Inspectors
   a. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
   b. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.

C. The Contractor shall not engage the same testing laboratory for construction services as the Owner has for quality assurance testing, unless agreed to by the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCOPE OF WORK

A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the Owner, Architect, and Engineer.

3.2 CONCRETE FORMING AND ACCESSORIES

A. Field Inspection:
1. Shallow Foundation Elements:
   a. Verify element width, length, depth, and elevation.
   b. Verify that forms are plumb and straight, braced against movement, and lubricated for removal.
   c. Verify that carton forms, if any, are dry and neatly formed around piers.

2. Slabs-on-Grade:
   a. Verify formwork at turndowns and slab edges is plumb and straight, braced against movement and lubricated for removal.
3. Columns and Walls:
   a. Verify that forms are plumb and straight, braced against movement, lubricated for removal, and conform to approved shop drawings.
   b. Verify proper dimensions and orientation.
   c. Verify top of column elevation is set in form and that it is 1/2 inch below the future slab soffit.

3.3 CONCRETE REINFORCING

A. Quality Assurance:
1. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and AWS.
2. Review welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing: The following tests shall be completed by the Testing Laboratory:

C. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:
1. Reinforcing Steel: The Testing Laboratory or designated Special Inspector shall inspect 100% of reinforcement before each concrete pour to verify the information noted below. Inspection reports shall be prepared and distributed in accordance with the local building code and as specified in this specification.
   a. Primary and secondary longitudinal reinforcement has correct size and number in proper layers.
   b. Longitudinal reinforcement has correct length and lap.
   c. Ties and stirrups are of correct size, spacing, and number and have the proper termination hook geometry.
   d. Unscheduled face reinforcement in beams are provided and are of correct size, number and spacing and have the proper end terminations.
   e. Proper hooks are provided at bar ends as detailed.
   f. Reinforcement is properly supported and braced to formwork to prevent movement during concrete placement.
   g. Reinforcement has proper cover.
   h. Sufficient spacing between reinforcement for concrete placement.
   i. Dowel reinforcement is of proper size, at proper spacing, and has proper lap length and embedment length.
   j. Welded wire reinforcement is composed of flat sheets, has proper wire gage and spacing, is properly supported, and is properly lapped.
   k. Proper construction/control/expansion joint spacing and reinforcement.
   l. Reinforcement around embedded items is placed according to details.
   m. Welded reinforcement has been done according to AWS requirements.

3.4 CAST-IN-PLACE CONCRETE

A. Quality Assurance:
1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
2. Preinstallation Meetings: The Testing Laboratory shall attend the preinstallation meetings as noted in Specification 03 30 00 "Cast-in-Place Concrete."

B. Source Inspection:

C. Field Testing: The following tests shall be completed by the Testing Laboratory:
1. During Concrete Placement:
a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
b. Mold concrete test cylinders as specified below in Paragraph 3.a.
c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
d. Record information for concrete test reports as specified below.
e. Pick up and transport to Laboratory cylinders cast the previous day.
2. After Concrete Placement:
a. Investigation of Low Strength Concrete Test Results:
1) Cost of Investigations for Low Strength Concrete: The Contractor shall reimburse the Owner for the costs of investigations of low strength concrete, as defined in Part I above.
2) Scope of Investigations: See Specification Section 03 30 00 "Cast-In-Place Concrete" for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.
b. Post-Installed Anchors in Concrete:
c. Floor Flatness and Levelness Measuring: Perform tests as defined below.
d. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering: Perform tests as defined below.
e. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
1) Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
2) Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation.
3. Standards for Concrete Tests:
a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:
1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6" in diameter by 12" or 4" in diameter by 8", however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.
2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.
3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab and pan-formed beam floors for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in

accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall reimburse the Owner for the cost of making and testing these cylinders.

4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:
   a) One set for each class of concrete taken not less than once a day.
   b) Piers, Straight Shaft Drilled Footings: One set for each 50 cubic yards or fraction thereof.
   c) Spread Footings: One set for each 50 cubic yards or fraction thereof.
   d) Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of floor area.
   e) All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof.
   f) No more than one set of cylinders at a time shall be made from any single truck.
   g) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
   h) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.
5) The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
6) For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
7) Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
8) Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
9) Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:
   a) Truck number and ticket number.
   b) Concrete Batch Plant.
   c) Mix design number.
   d) Accurate location of pour in the structure.
   e) Strength requirement.
   f) Date cylinders made and broken.
   g) Technician making cylinders.
   h) Concrete temperature at placing.

i) Air temperature at point of placement in the structure.
j) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
k) Slump.
l) Unit weight.
m) Air content.
n) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.

b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.

c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken at the point of placement.

d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.

e. Unit Weight Test: ASTM C 138.

4. Evaluation and Acceptance of Concrete:

a. Strength Test: A strength test shall be defined as the average strength of two six inch cylinder breaks or three four inch cylinder breaks from each set of cylinders tested at the time indicated above.

b. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:

1) The average of all sets of three consecutive strength tests equal or exceed the required f'c.
2) No individual strength test falls below the required f'c by more than the greater of 10% of f'c or 500 PSI.

c. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.

D. Field Inspection: The scope of the work to be performed by the inspector on the jobsite shall be as follows:

1. Before Concrete Placement:

a. Inspect concrete formwork per Article 0.
b. Inspect concrete reinforcing per Article 3.3.
c. Inspect bolts and rods to be embedded in concrete for proper grade, size, length, and embedment.
d. For slabs-on-grade, verify that the moisture retarder is provided, is lapped properly, and is not torn or punctured.
e. Verify that there is no standing water in pour area and that all debris has been removed from the area and from the formwork.

f. Verify that openings and sleeves in slabs, walls or grade beams are correct size and location. Verify that the openings are shown on the structural drawings and notify the Engineer immediately of any openings in the field that are not shown on the drawings.

2. During Concrete Placement: Provide continuous monitoring to:
   a. Upon arrival of concrete, inspect the concrete to verify that the proper concrete mix number, type of concrete, concrete strength is being placed at the proper location. Verify that the mix meets the project specifications and is not over 90 minutes old at the time of placement. Report concrete not meeting the specified requirements and immediately notify the Contractor, Batch Plant Inspector, Architect, Engineer, and Owner.
   b. Inspect plastic concrete upon arrival at the jobsite to verify proper batching. Observe mix consistency and adding of water as required to achieve target slumps in mix designs. The responsibility for adding water to trucks at the job site shall rest only with the Contractor's designated representative. The Contractor is responsible that all concrete placed in the field is in conformance to the Contract Documents.
   c. Verify that the Contractor is following appropriate Hot Weather or Cold Weather concreting practices consistent with any extreme environmental conditions at the point of placement in the structure.
   d. Verify that concrete deposited is uniform and that vertical drop does not exceed six feet and is not permitted to drop freely over reinforcement causing segregation.
   e. Verify that the formwork has remained stable during the concreting operation.
   f. Verify that there are no cold joints.
   g. Verify that the concrete is properly vibrated.
   h. Inspect bolts embedded in concrete during concrete placement for verification that they have been properly installed to the specified embedment.
   i. Verify that the finishing of the concrete surface is done according to specifications.
   j. The Testing Laboratory shall report any irregularities that occur in the concrete at the job site or test results to the Contractor, Architect, Owner, and Engineer.

3. After Concrete Placement:
   a. Verify that the curing process is according to Specifications and that any curing compound used is applied in accordance with the manufacturer's recommendations.
   b. Verify that sawcut control joints in slab-on-grades are cut within 12 hours of placement.
   c. Post-Installed Anchors in Concrete: Provide inspection of post-installed anchor installations at the frequency noted in the specifications and in accordance with the published, currently valid, Evaluation Service Report (ESR) for each anchor product. Post-installed anchors include anchors and reinforcing steel. Inspection of post-installed anchors shall include but not be limited to the following:
      1) Periodic Inspection: Verify initial installation of post-installed anchors in concrete for each individual installer with each individual anchor product in accordance with the requirements stated below for each type of anchor. Periodically inspect anchor installation after the initial verification.
      2) Continuous Inspection: Verify each installation of post-installed anchors in concrete in accordance with the requirements stated below for each type of anchor.

3) All Post-Installed Anchors: Verify that the anchor is installed in accordance with manufacturer's printed installation instructions as well as the following design requirements.
   a) Concrete type, concrete strength and concrete thickness are in accordance with design drawings.
   b) Anchor manufacturer and product, including material, is in accordance with design drawings or approved substitution.
   c) Anchor diameter, length and installed embedment depth.
   d) Drill bit type and diameter.
   e) Anchor edge distance and spacing.
   f) Hole diameter and depth.
   g) Hole cleaning procedure and cleanliness.
   h) Anchor maximum tightening torque.
4) Adhesive Anchors: In addition to the requirements for All Post-Installed Anchors, verify adhesive identification and expiration date.
   a) The installation of all adhesive anchors shall be continuously inspected when anchors are subject to sustained tension loads, such as anchors for shelf angles, or when anchors are installed in an upwardly inclined condition.

E. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:
   1. Wrong class of concrete (incorrect mix design number).
   2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
      a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.
      b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.
      c. Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.
   3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
   4. Air contents outside the limits specified in the mix designs.
   5. Slumps outside the limits specified.
   6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.

F. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.5 MASONRY
A. Quality Assurance:

1. Concrete Masonry Unit: For each type of concrete masonry unit indicated, verify compliance with ASTM C 90 and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.
2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing:
   1. Masonry Strength Testing:
      a. Verification Testing Frequency: Verification of masonry strength (f'm) will be performed at the beginning of masonry construction.
      b. Mortar:
         1) As construction begins, verify the proportions of the site-prepared mortar mix comply with the requirements of ASTM C 270 for the type specified.
         2) Verify the proportions of materials in premixed or preblended mortar comply with the requirements of ASTM C 270 for the type specified as delivered to the site.
      c. Grout:
         1) Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM C 476 for each type of grout used.
         2) Verify the proportions of materials in premixed or preblended grout comply with the requirements of ASTM C 476 as delivered to the site.
         3) For grout pre-mixed at a batch plant or otherwise not prepared on site, grout shall be sampled and tested in accordance with ASTM C 1019. Prepare one set of grout samples for testing at seven days and two sets for testing at 28 days.
      d. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.
      e. Retests: Where tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.
   2. Testing of Non-Shrink Grout for Base Plates and Bearing Plates:
      a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
      b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

C. Field Inspection:
   1. Mortar Joints: As construction begins, verify that mortar joints are being prepared in accordance with these specifications and ACI 530.1/ASCE 6/TMS 602.
   2. Reinforcement and Connectors: Prior to grouting, verify the size, grade, type and placement of reinforcement and connectors is in compliance with specified requirements.
   3. Grouting: Prior to any grouting procedure, the grout space shall be inspected to verify that it is clean and that cleanouts, if required, are in place and conform to requirements.

Verify through continuous inspection that the placement of grout is in compliance with the requirements of the contract specifications and ACI 530.1/ASCE 6/TMS 602.

4. Anchors: Periodically verify the type, size and location of anchors including anchors of masonry to other structural members, frames, or construction is in compliance with specified requirements.
5. Welding of Reinforcing Bars shall not be allowed.
6. Installed items: Verify that installed flashing, weep holes, construction joints, control joints and wall vents are installed in accordance with specifications.

3.6 STRUCTURAL STEEL

A. Scope of Work:

1. Contract Obligations:

a. Owner Responsibility: The Owner shall pay for initial shop and field inspections and tests as required during the fabrication and erection of the structural steel.

b. Testing Laboratory Responsibility: The inspection by the Testing Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to Paragraph 1.9B.4 for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.

c. Rejection of Material or Workmanship: The Owner, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not allow waiving the obligation for timely, in sequence inspections.

B. Quality Assurance:

1. Verify the fabrication shop's certification from AISC.
2. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.
3. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

C. Field Testing: The Testing Laboratory shall provide the following tests in the field:

1. Test welds completed in the field according to Paragraph F "Weld Testing:" below.
2. Test bolted connections completed in the field according to Paragraph I "High-Strength Bolt Testing."
3. Perform bend tests on completed shear connectors attached to beams as required according to procedures outlined in AWS D1.1. In addition, perform field bend tests

on an additional 2% of completed shear connectors on each beam but not less than one connector per beam.

4. Testing of Non-Shrink Grout for Base Plates and Bearing Plates:
   a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
   b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

D. Field Inspection: The Testing Laboratory shall provide the following inspections in the field:
   1. Inspect galvanized HSS and other cold-worked structural steel members for cracking or other damage resulting from galvanizing process. Endeavor to complete inspections prior to erection of these members. Immediately notify Contractor and Architect/Engineer of any irregularities discovered.
   2. Provide continuous or periodic monitoring of field welding as described below in Paragraph E "Weld Inspection and Process Monitoring."
   3. Provide continuous or periodic monitoring of field bolting as described below in Paragraph 0 "High-Strength Bolt Inspection and Process Monitoring" of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without match-marking or calibrated wrench method of bolt installation.
   4. Inspect welded or bolted connections that were completed, but not inspected, in the shop. Perform inspections according to Paragraph E "Weld Inspection and Process Monitoring" and/or Paragraph 0 "High-Strength Bolt Inspection and Process Monitoring" as appropriate.
   5. Obtain the planned erection procedure, and review with the Erector's supervisory personnel.
   6. Check the installation of base plates for proper leveling, grout type, and grout application.
   7. Check structural steel as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and specified ASTM standards for other steel.
   8. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.
   9. Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.
   10. Inspect 100% of the column compression and base joints for verification that gaps in contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than 1/4 inch shall be reported to the Owner and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed according to Specification 05 12 00 "Structural Steel Framing."
   11. Endeavor to guard the Owner against the Contractor cutting, grinding, reaming, or making any other field modification to structural steel without the prior approval of the Engineer. Report any noted unauthorized modifications to the Owner and Engineer.

E. Weld Inspection and Process Monitoring: The Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:

1. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
2. Periodically verify welding electrodes to be used and other welding consumables as the job progresses.
3. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
4. Continuously observe joint preparation and fit up, backing strips, and runout plates for welded moment connections and column splices.
5. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
6. Visually inspect 100% of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded non-tubular connections.
7. Visually inspect 100% of completed shear connectors on each beam.
8. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.
9. In addition to the inspections above, perform the following:
    a. The following paragraph is required by IBC (Items 5.a.1, 5.a.2, 5.a.3, and 5.a.4 from Table 1704.3, 2009). This paragraph may be deleted if Special Inspections are not required as a less rigorous version of this requirement is provided in Paragraph 3 above. However, the following is good engineering practice and it is recommended to keep this for most large structural steel projects regardless of code requirements.
    b. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.
    c. Periodically monitor the welding of headed studs to floor beams.
    d. Periodically monitor the welding of anchors to embedded plates that are to be cast into concrete elements.

F. Weld Testing:
1. Perform nondestructive examination services using a qualified technician with the necessary equipment to perform the following:
    a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
    b. Interpret, record, and report results of the nondestructive tests.
    c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
    d. Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
    e. Verify that quality of welds meet the requirements of AWS D1.1.
2. Fillet Welds: Provide the following:
    a. MT test a minimum of 10% of the length of each fillet weld exceeding 5/16".
3. Partial Joint Penetration (PJP) Welds, including Flare-Bevel Groove Welds: Provide the following:
    a. MT test a minimum of 25% of the length of each PJP weld exceeding 5/16" effective throat.

b. Periodic MT testing of representative PJP welds 5/16" and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.

4. Complete Joint Penetration (CJP) Welds: Provide the following:
   a. All CJP welds exceeding 5/16" thickness shall be 100% UT tested per AWS D1.1 Clause 6 Part F. The Testing Laboratory shall review the CJP joints to determine where geometry or accessibility precludes the use of standard scanning patterns per AWS D1.1 Clause 6 Part F. At these locations the testing laboratory shall develop and submit for approval a written testing procedure in accordance with AWS D1.1 Annex S.
   b. Periodic MT testing of representative CJP welds 5/16" and less not to exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
   c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
5. Acceptance Criteria:
   a. Visual, MT, PT shall be per AWS D1.1 Table 6.1.
   b. UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
6. Welds of Anchors to Embedded Plates:
   a. Headed Studs: Perform field bend tests according to AWS D1.1 on 2% of the studs welded to plates, but not less than one stud per plate.
   b. Deformed Bar Anchors: Perform MT testing on 10% of deformed bar anchors larger than #5 bar.
7. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory providing services for the Owner shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.

G. High-Strength Bolt Inspection and Process Monitoring: The Testing Laboratory shall perform the following inspections for connections joined with high-strength bolts. Bolting performed in the shop may be inspected in the field unless continuous monitoring of the bolting operation is specified herein:
1. Observe preinstallation verification testing of the pretensioning method to be used in accordance with the requirements of the "Specification for Structural Joints Using High-Strength Bolts".
2. Check daily the calibration of impact wrenches used in field bolted connections.
3. Inspect bolt installation for 100% of high strength bolted connections according to inspection procedures outlined in the "Specification for Structural Joints Using High-Strength Bolts".
4. Monitoring of Bolting Installation:
   a. Continuous Monitoring: The Testing Laboratory shall be continuously present and monitor the bolting installation for compliance with the selected procedure for installation as specified in the "Specification for Structural Joints Using High-Strength Bolts" for joints using high-strength bolts that are designated on the plans as Pretensioned (PT) or Slip-Critical (SC) type joints and that are being installed using the calibrated wrench method or the turn-of-nut without matchmarking method of installation.
   b. Periodic Monitoring: All other joint types and bolt installation methods shall be monitored on a periodic basis.

H. High-Strength Bolt Testing: The Testing Laboratory shall perform the following tests for connections joined with high-strength bolts:

1. Perform Arbitration Testing according to procedures outlined in the "Specification for Structural Joints using High-Strength Bolts" when a disagreement exists between the Testing Laboratory and the Fabricator as to the minimum tension of installed bolts that have been inspected according to paragraph below.

3.7 STEEL JOISTS

A. Scope of Work: The Testing Laboratory shall perform inspection of steel joists as described herein.

B. Quality Assurance:
1. Verify that the fabricator maintains detailed quality control procedures that provide a basis for inspection control of workmanship and of the ability to conform to approved construction documents and industry standards. Verify that these procedures are complete and adequate relative to code requirements for fabricator's scope of work.
2. Verify welding procedures, welder qualifications and weld material prior to the start of work.
3. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

C. Field Testing:
1. Perform Magnetic Particle testing (MT) on representative field welds not to exceed 10% of such welds unless rejection rates become high, in which case, frequency of inspection shall be increased to ensure acceptable welding.

D. Field Inspection: The duties of the Testing Laboratory shall be as follows:
1. Inspect joists for damage during shipment.
2. Visually inspect 100% of welded chord splices for compliance with SJI and project specifications.
3. Verify proper bearing of joist supports.
4. Confirm bridging size and location.
5. Visually inspect 100% of field attachment of joists to supports (welding or bolting).
6. Confirm bolting of joists to supports at column lines as required by OSHA requirements.
7. Verify that no joists have been damaged during erection.

3.8 STEEL DECKING

A. Field Inspection:
1. Check steel deck as received in the field for possible shipping damage, workmanship, and identification marking to conform to specified ASTM standards for steel deck.
2. Periodically monitor the method of attaching the steel floor and roof decking to the structural frame.
3. Visually inspect 100% of the welding or other attachment method of steel deck to the structure and at sidelaps.

3.9 EARTHWORK

A. Quality Assurance:
1. Welder Qualifications: Verify welder qualifications either by certification and/or by retesting. Obtain welder certificates.

B. Field Testing:
1. Compacted Fill:
a. Verification of Fill Material: Perform classification and testing to verify that the fill material to be used complies with the project specifications.

b. Field Density Testing: Perform field density testing as described below:
   1) Field density tests shall be run according to ASTM D 2937 or ASTM D 6938 as applicable.
   2) Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.
   3) Test Frequency for Paved Areas and Building Slab Subgrade:
      a) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
      b) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.
   4) Test Frequency for Foundation Wall Backfill: Make at least one field density test for each 200 lineal feet of wall with a minimum of 4 tests for the basement walls around the perimeter of each building and a minimum of one test for every other type of foundation wall on the site. Tests shall be performed in random lifts along each wall.
c. Report Copies: Moisture-density curves and results of field density tests shall be submitted to the parties specified earlier in this section.
d. Additional Testing: If reports by the Laboratory indicate field densities lower than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be liable to the Owner for repayment by the Contractor.

2. Drilled Piers:
   a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.
3. Spread (Excavated) Footings
   a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.

C. Field Inspection by the Testing Laboratory:
1. The Testing Laboratory shall provide inspection of materials used in foundation elements as described below.
2. Compacted Fill:
   a. Subgrade below Compacted Fill: Observe and verify that the subgrade below compacted fill has been properly prepared before compact fill construction begins.
   b. During placement and compaction of fill, determine that the material being used and the maximum lift thickness comply with the specifications.
3. Drilled Piers:
   a. Reinforcing Steel: Inspect reinforcing steel for proper number and size of bars and confirm dowel or anchor rod placement into top of pier.
4. Spread (Excavated) Footings:
   a. Reinforcing Steel: Inspect reinforcing steel size, number of bars, and placement and confirm dowel or anchor rod placement into footing.

D. Foundation Inspection by the Geotechnical Engineer: The Geotechnical Engineer of Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.

1. Spread (Excavated) Footing:
   a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.
2. Drilled Piers:
   a. Bearing Elevation: Observe that piers are founded in proper bearing strata as defined in the Geotechnical Report and that bottom of hole is clean and properly formed. Recommend appropriate action if specified bearing elevation does not provide proper strength.
   b. Bell and Shaft Sizes: Verify that the shaft and bell diameters are within specified tolerances.
   c. Shaft Stability: Observe the shaft sides as drilling proceeds and recommend appropriate action if sloughing becomes excessive.
   d. Concrete Quantities: Record quantity of concrete placed in each pier and compare against theoretical quantity required. Report discrepancies to Engineer.
   e. Placement Method: Observe that piers are placed by approved methods as defined in the Geotechnical Report and in the Specifications. Confirm that casings are being used as recommended in the Geotechnical Report. Confirm that concrete is not being contaminated by soil encroachment into pier.
   f. Report: For each drilled shaft installed, prepare and submit a report indicating the following information:
      1) Name of the Project.
      2) Name of the drilling contractor
      3) Name of the field superintendent.
      4) Pier number and location.
      5) Pier shaft diameter.
      6) Bottom elevation.
      7) Top elevation.
      8) Pier length.
      9) Theoretical volume of concrete in pier.
      10) Estimate of actual volume of concrete placed.
      11) Reinforcing steel size and depth actually placed.
      12) Drilling start and finish time.
      13) Concreting start and finish time.
      14) Variation from specified tolerances including surveyed location and plumbness.
      15) Construction method (dry method, casing method, or slurry displacement method).
      16) Groundwater conditions (rate of water infiltration and depth of water in hole prior to concreting for dry piers; water elevation in hole for wet piers).
      17) Elevation of top and bottom of any casing left in place.
      18) Description of temporary or permanent casing (including purpose, diameter, wall thickness and length).
      19) Description and elevation of any obstructions encountered and whether removal was obtained

20) Description of pier bottom including amount and extent of loose material.
21) Method of concrete placement.
22) Any difficulties encountered in drilling or concreting operations.
23) Any deviations from specifications.
24) The report shall be signed by a licensed engineer in the state where the project is located.

END OF SECTION 01 45 29

SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

A. 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's construction forces, Engineer, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.

C. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.3 INFORMATION SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

1.4 QUALITY ASSURANCE

A. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1, and Texas Accessibility Standards (TAS) 2012.

B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. 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.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid propane gas or fuel oil heaters with individual space thermostatic control.

1. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
2. 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. Clean HVAC system as required in Section 01 7700 and install new filter with MERV 11 or greater.

C. Air Filtration Units: Primary and secondary HEPA filter equipped portable units with four stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.2 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.

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.

3.3 SUPPORT FACILITIES INSTALLATION

A. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

1. Maintain support facilities until Engineer 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. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

I. Temporary Elevator Use: Use of elevators is not permitted.

J. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

K. 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.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Engineer.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Engage pest control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin. provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

H. 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.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. 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 weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

L. Temporary Partitions: Provide floor to ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas occupied from fumes and noise.
1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire retardant treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6 mil (0.14 mm) polyethylene sheet on each side. Cover floor with two layers of 6 mil (0.14 mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire retardant treated plywood. Do not apply tape to finish floor surfaces.
    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water dampened foot mats in vestibule.
3. Where fire resistance rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air handling equipment.
7. Provide walk off mats at each entrance through temporary partition.

M. 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; manage fire-prevention program.
1. Prohibit smoking in construction areas.

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.

3.5 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. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform Work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Condition Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Engineer.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

E. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00".

END OF SECTION 01 50 00

SECTION 01 52 14 TEMPORARY FACILITIES FOR STUDENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Sections:

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

1.3 DESCRIPTION OF REQUIREMENTS

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

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 be 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, 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 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 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.

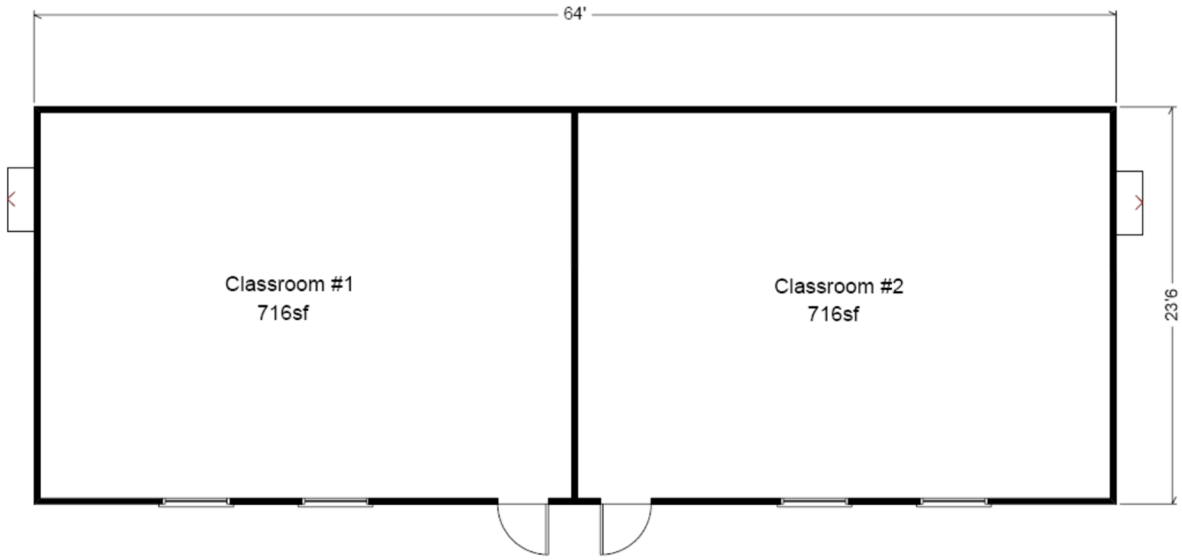
W. Hitch/Tires/Axles: Hitches will be removed and stored under building while tires and axles are to remain on the modules. Tires and axles will be removed only if necessary to complete the building installation due to site constraints and will also be placed under the modules.

1.5 Furniture, Fixtures, and Equipment (FF&E)

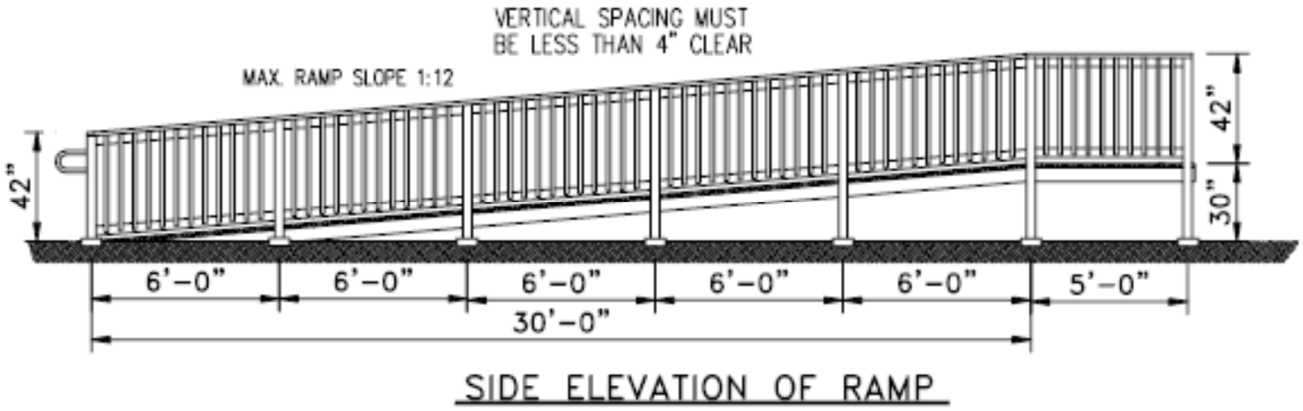
A. The Contractor shall furnish and set in place all FF&E items necessary for a functional classroom. The furniture may be provided by FBISD, but will be the full responsibility of the contractor to move to site and back to origin. These items should include, at a minimum: student desks and chairs, teacher 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

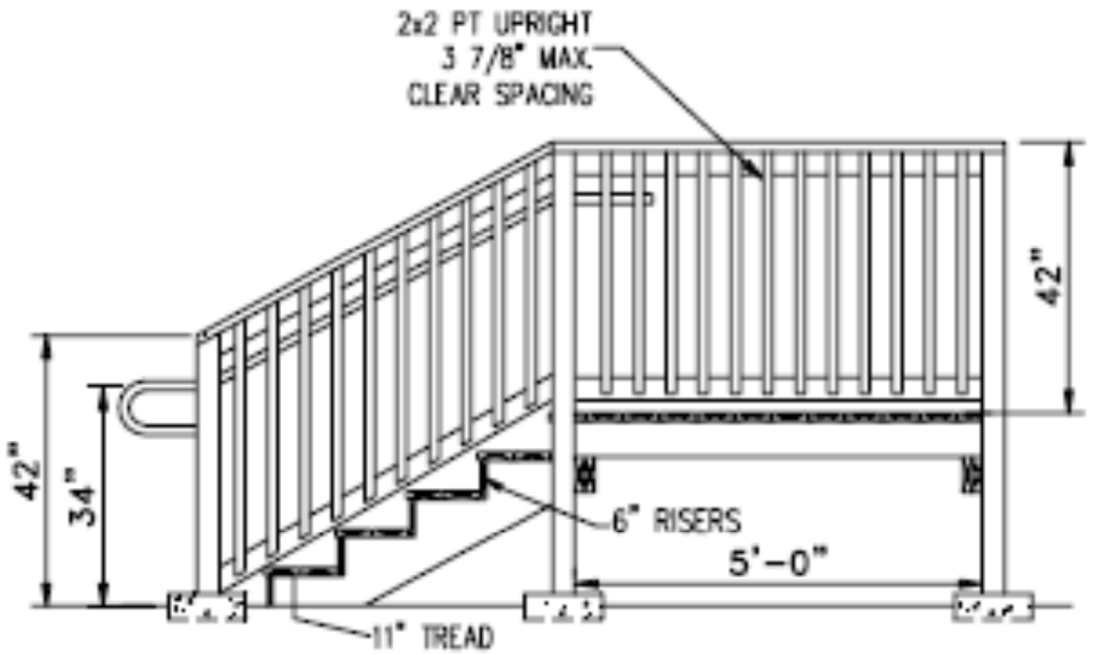
A. The following is a typical floor plan design guideline drawing:



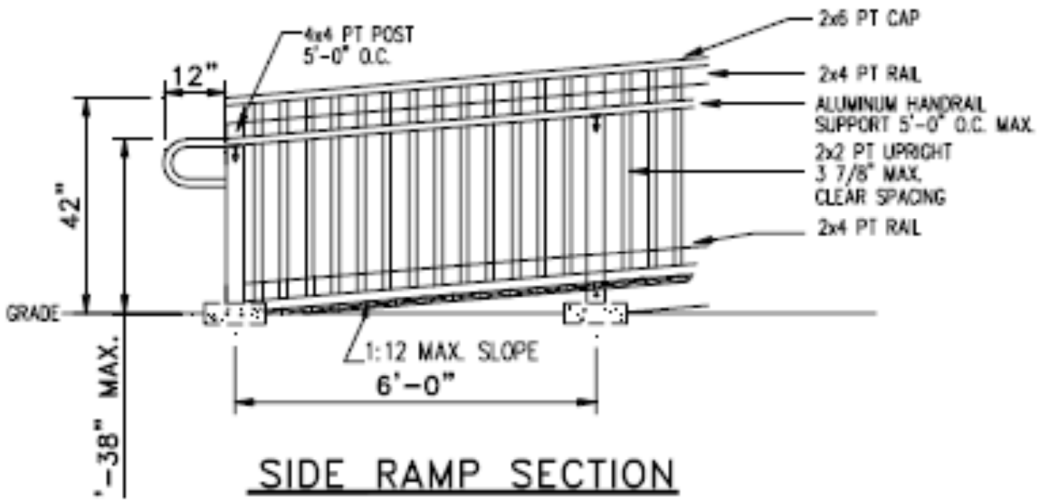
A. The following design guideline drawings are to be used for ramps/walkways:



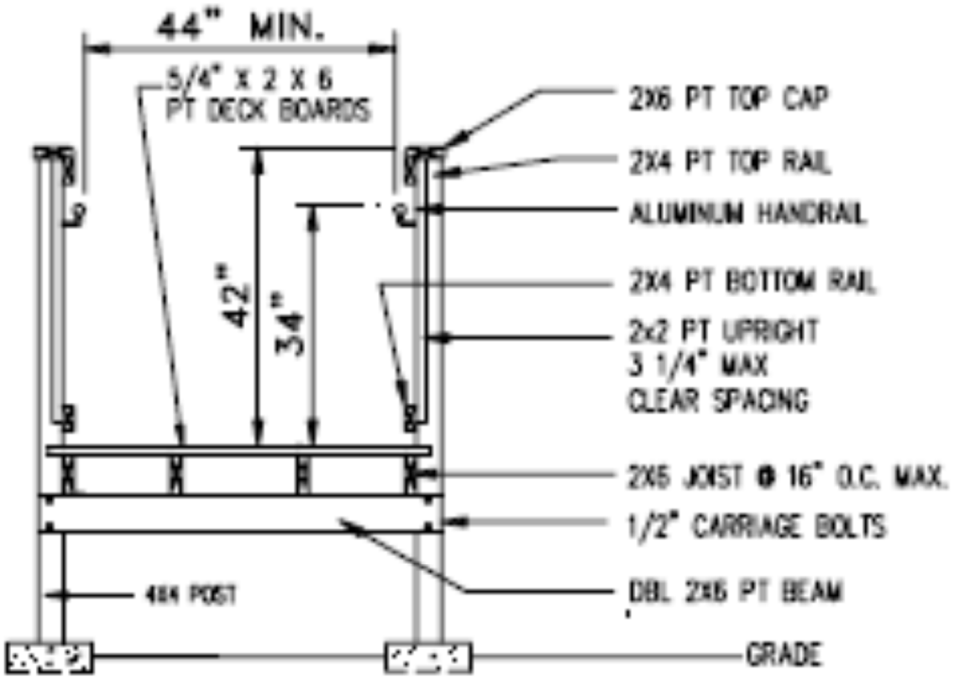
SIDE ELEVATION OF RAMP



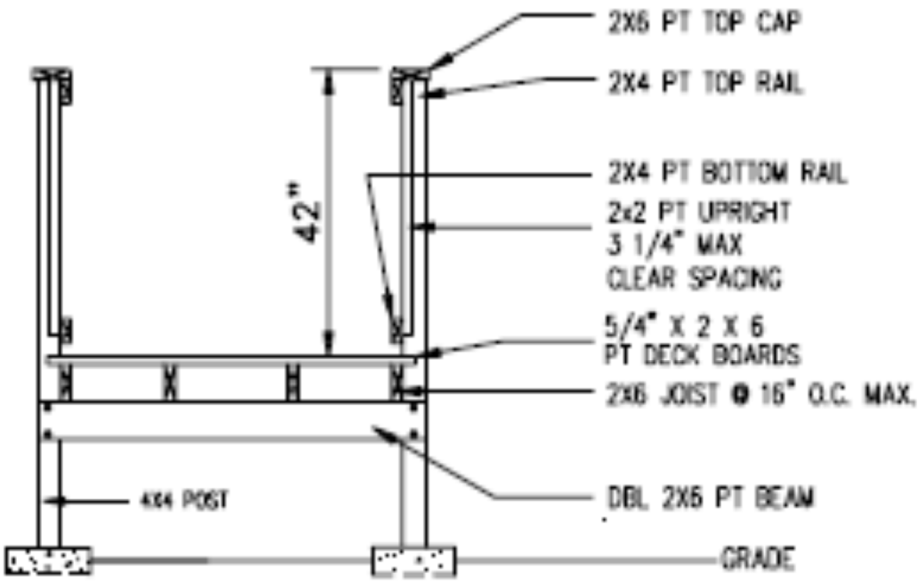
SIDE ELEVATION OF STEP



SIDE RAMP SECTION



STEP/RAMP SECTION



ELEV. WALKWAY SEC 'A'

End of Section 01 52 14

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.

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.

PART 3 EXECUTIO0N

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

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.

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

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.

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.

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 comer and pull posts; with 1-518 inch (42 mm) OD top trails, 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 no 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 be dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
   1. Apply 4 inch (100 mm) average thickness or organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.
   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 ASTMF567 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".

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 utilizes. 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: Pune 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.

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. Proved 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

SECTION 01 57 00 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.

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 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 GENERAL SOURCE CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for erosion protection and sediment control related practices which shall be utilized during construction operations.

1.2 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. No clearing and grubbing or rough cutting, other than as specifically directed by the Engineer to allow for soil testing and surveying, shall be permitted until sediment control and erosion protection systems are in place.

B. The Contractor shall prohibit equipment and vehicles from maneuvering on areas outside of dedicated rights of way and easements for construction. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately

3.2 TOPSOIL PLACEMENT FOR EROSION AND SEDIMENTATION CONTROL SYSTEMS

A. When topsoil is called for as a component of another item, Contractor shall conduct erosion control practices during topsoil operation.

B. When applying topsoil, Contractor shall maintain erosion and sediment control systems, such as swales, berms, dikes, and sediment basins. Contractor shall place the topsoil to the lines and grades and to the depths shown on the construction plans.

C. After the areas to receive topsoil have been brought to grade and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of at least 2 inches, to permit bonding of the topsoil to the subsoil.

D. Contractor shall compact by passing a bulldozer up and down the slope, tracking over the entire surface area of the slope to create horizontal erosion control slots. When grading, filling, and applying topsoil around trees, Contractor shall maintain the existing grade within the drip line of trees, unless otherwise indicated.

E. No sod, seed, or other vegetation shall be placed on soil that has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 PROTECTION OF TREES IN CONSTRUCTION AREAS

A. Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site. Heavy equipment, vehicular traffic, and stockpiles of construction materials, including topsoil, are not permitted within 3 feet of the dripline of any tree to be retained. Specimen trees shown on the construction plans shall be boxed or fenced for protection.

B. Contractor shall water those trees indicated to be preserved, as required, to maintain their healthy growth during the course of construction operations.

C. Contractor shall protect tree root systems from damage due to noxious materials in solution caused by runoff or spillage during mixing and placement of construction materials or drainage from stored materials.

3.4 DUST CONTROL

A. Control dust blowing and moving on construction sites and roads for erosion and sediment control, to prevent exposure of soil surfaces, to reduce on and off site property damage, to prevent health hazards, and to prevent hazardous sight conditions. Control dust blowing by utilizing one or more of the following methods:
   1. Mulches bound with natural or chemical binders such as Soiltac®, Terratack®, or equal, as approved by the Engineer.
   2. Temporary or permanent vegetative cover.
   3. Spray-on adhesive, such as Soil Master®, PennzSuppress®, Soil Sement®, or equal, on mineral soils when not used by traffic and as approved by the Engineer.
   4. Tillage to roughen surface and bring clods to the surface.
   5. Irrigation by water sprinkling.
   6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

B. Dust control methods shall be implemented immediately whenever dust can be observed blowing on the project site.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Maintenance and repair of construction machinery and equipment shall be confined to areas specifically designated for that purpose. Designated areas shall be located, designed, and maintained so as oils, gasoline, grease, solvents, and other potential pollutants cannot be washed into the storm sewer system or any other receiving stream.

B. Contractor shall not allow oils, gasoline, waste fluids, and other potential pollutants to spill onto the soil or seep into the ground and groundwater. Adequate waste disposal receptacles shall be provided for liquid waste, as well as solid waste. Proper spill response measures and materials will be the responsibility of the Contractor. Designated maintenance areas shall be inspected and properly maintained daily.

C. On a site where designated equipment maintenance and repair areas are not feasible, care shall be taken during each individual repair or maintenance operation to prevent spills of potential pollutants. All applicable local, State and Federal Regulations shall be followed for the proper handling, storage, and waste disposal of oils, gasoline, grease, solvents, and other designated potential pollutants associated with the maintenance and repair of construction machinery and equipment.

3.6 WASTE COLLECTION AND DISPOSAL

A. A plan shall be implemented for the collection and disposal of on site general trash, as well as construction debris. Disposal of waste materials shall be in compliance with current local, State and Federal Regulations. Trash and debris shall not be allowed to overflow its receptacle or accumulate for excessively long periods of time. Receptacles shall be located where they will least likely be affected by storm water runoff. Trash and construction debris shall not be burned on the project right-of-way.

B. Special provisions shall be made for the collection and disposal of liquid, toxic, or hazardous materials.

3.7 SANITARY FACILITIES

A. Adequate sanitary facilities shall be provided for workers. Sanitary collection and disposal shall be in compliance with current local, State and Federal Regulations.

3.8 VEHICLE WASHING

A. Construction equipment and vehicles, such as concrete trucks, shall be washed in designated areas only, as approved by the Engineer. These designated wash areas shall be designed and maintained such as to prevent runoff from leaving the site, as well as preventing the runoff from entering a storm sewer system or into a watercourse. The designated areas shall be located where the wash water will evaporate or infiltrate directly into the ground and where runoff can be collected in a temporary holding or seepage basin. Wash areas shall not be located immediately adjacent to a storm sewer system or other watercourse or near a designated jurisdictional wetland. Concrete waste shall be permitted to dry in a controlled pit, sump, or other, and the waste shall be removed from the project site.

3.9 STORAGE OF CONSTRUCTION MATERIALS, CHEMICALS, ETC.

A. Storage of chemicals, cements, solvents, paints, pesticides, herbicides, fuels, or other potential pollutants shall be stored so that they will not be in contact with storm water runoff or cause potential leachate to the soil or groundwater. These items shall not be stored adjacent to a storm sewer system or other watercourse. Storage and use shall be in compliance with current local, State and Federal Regulations, as well as manufacturer's guidelines.

B. Contractor shall have a spill response program which addresses spills of construction related hazardous and toxic materials.

3.10 DEMOLITION AREAS

A. Demolition projects usually generate large amounts of dust with significant concentrations of heavy metals and other toxic pollutants. Dust control techniques shall be used to limit the transport of the airborne pollutants. Water or slurries used to control dust shall not be allowed to flow into the storm sewer system or other watercourse.

3.4 STREETS CLEANING

A. Street cleaning, such as sweeping, vacuuming, or shoveling, shall be provided along project area roadways where erosion have deposited or construction traffic have tracked sediments, mud, or debris.

B. Contractor shall inspect the roadways daily, and perform the cleaning on a daily basis, if necessary. Washing or flushing of sediments, mud, or debris into adjacent drainage systems is prohibited.

3.11 PESTICIDES, HERBICIDES, AND FERTILIZERS:

A. Contractor shall only use pesticides, herbicides, and fertilizers on the construction site as indicated in the construction specifications and plans or as approved the Engineer. Pesticides, herbicides, and fertilizers shall be stored, used, applied, and disposed of in accordance with manufacturer's guidelines and with local, state, and federal regulations.

B. Contractor shall not dispose of the pesticide, herbicide, and fertilizer wastes, and containers, on site or in the storm sewer system or other watercourse

END OF SECTION 01 57 13

SECTION 01 57 13.13 FILTER FABRIC FENCE

PART 1 - GENERAL

1.1 SCOPE

A. Installation of erosion and sediment control filter fabric fences used during construction and until final development of the site. The purpose of filter fabric fences is to contain pollutants from overland flow. Filter fabric fences are not for use in channelized flow areas.

1.2 REFERENCE STANDARDS

A. ASTM D-3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics.

B. ASTM D-4632 - Standard Test Method for Breaking Load and Elongation of Geotextile.

1.3 SUBMITTALS

A. Manufacturer's catalogue sheets and other pertinent information on geotextile fabric.

PART 2 - PRODUCTS

2.1 FILTER FABRIC

A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.

B. Geotextile fabric shall have a grab strength of 100 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size between 50 and 140.

C. Filter fabric material shall contain ultraviolet inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F.

PART 3 - EXECUTION

3.1 PREPARATION AND INSTALLATION

A. Provide erosion and sedimentation control systems at the locations shown on the Drawings. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on the Drawings and set out in this Section.

B. No clearing and grubbing or rough cutting shall be permitted until erosion and sedimentation control systems are in place.

C. Regularly inspect and repair or replace components of all erosion and sedimentation control systems as specified for each type of system. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project area stabilization is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials off site.

D. Remove sediment deposits and dispose of them at the designated spoil site for the project. If a project spoil site is not designated on the Drawings, dispose of sediment off site at a location not in or adjacent to a stream or floodplain. Off-site disposal is the responsibility of the Contractor. Sediment to be placed at the project site should be spread evenly throughout the site, compacted and stabilized. Sediment shall not be allowed to flush into a stream or drainage

way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state, and local rules and regulations.

3.2 CONSTRUCTION METHODS

A. Provide filter fabric fence systems in accordance with the Drawing detail for Filter Fabric Fences. Filter fabric fences shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the filter fabric to 2-inch by 2-inch wooden stakes spaced a maximum of 3 feet apart and embedded a minimum of 8 inches. If filter fabric is factory preassembled with support netting, then maximum spacing allowable is 8 feet. Install wooden stakes at a slight angle toward the source of anticipated runoff.

C. Trench in the toe of the filter fabric fence with a spade or mechanical trencher as shown on the Drawings. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. Filter fabric fence shall have a minimum height of 18 inches and a maximum height of 36 inches above natural ground.

E. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

F. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately. Remove sediment deposits when silt reaches a depth one-third the height of the fence or 6 inches, whichever is less.

END OF SECTION 01 57 13.13

SECTION 01 57 13.14 REINFORCED FILTER FABRIC BARRIER

PART 1 - GENERAL

1.1 SCOPE

A. This Section describes the installation of erosion and sedimentation control of reinforced filter fabric barriers (RFB) which must be utilized during construction. Reinforced filter fabric barrier is to be utilized to retain pollutants from passing downstream in channelized flow areas.

1.2 REFERENCE STANDARDS

A. The publications listed below forms a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

1. ASTM D-3786 - Standard Test Method for Hydraulic Bursting Strength Textile Fabrics.
2. ASTM D-4632 - Standard Test Method for Breaking Load and Elongation of Geotextile (Grab Method).

1.3 SUBMITTALS

A. Manufacturer's catalogue sheets and other pertinent information on geotextile fabrics.

PART 2 - PRODUCTS

2.1 FILTER FABRIC

A. Provide woven or nonwoven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.

B. Bu ASTM -D4632, Geotextile fabric shall have a grab strength of 100 psi in any principal direction, a Mullen burst strength exceeding 200 psi by ASTM D-3786, and the equivalent opening size between 50 and 140.

C. Filter fabric material shall contain ultraviolet inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0 degrees F to 120 degrees F.

D. Representative Manufacturers: Mirafi, Inc. or preapproved equivalent.

2.02 FILTER FABRIC REINFORCEMENT

A. Provide woven galvanized steel wire fence with minimum thickness of 14 gauge and a maximum mesh spacing of 6 inches.

B. Welded wire shall be galvanized, 2-inch by 4-inch, welded wire fabric, 12 ½ gauge.

PART 3 - EXECUTION

3.1 GENERAL

A. A Provide erosion and sediment control systems at the locations shown on Plans. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on the Plans and specified in this Section.

B. Erosion and sediment control measures shall be in place prior to the start of any Work that exposes the soil, other than as specifically directed by the Engineer to allow soil testing and surveying.

C. Regularly inspect and repair or replace damaged components of filter fabric barrier. Unless otherwise directed, maintain the erosion and sediment control systems until the Work is accepted by the Owner. Remove erosion and sediment control systems promptly when directed by the Engineer.

3.2 CONSTRUCTION METHODS

A. Provide filter fabric barriers for erosion and sediment control used during construction and until the final development of the Project Site. Reinforced filter fabric barriers are used to retain sedimentation in channelized flow areas.

B. Provide reinforced filter fabric barrier in accordance with the Plan detail for Reinforced Filter Fabric Barrier. Reinforced filter fabric barrier systems shall be installed in such a manner that runoff will percolate through the system and allow sediment to be retained and accumulated.

C. Trench in the toe of the reinforced filter fabric barrier with a spade or mechanical trencher as shown on the Plans. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. Reinforced filter fabric barrier shall have a height of 18 inches.

E. Securely fasten the filter fabric to the wire with tie wires.

F. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

G. Inspect the reinforced filter fabric barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once each week. Repair or replace damaged sections immediately. Remove sediment deposits when silt reaches a depth one-third the height of the barrier or 6 inches, whichever is less.

3.3 MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for materials and labor performed under this section. Include all costs in the lump sum price, or in the unit price for Storm Water Pollution Prevention Plan.

END OF SECTION 01 57 13.14

SECTION 01 57 13.15 STABILIZED CONSTRUCTION EXIT

PART 1 - GENERAL

1.1 SCOPE

A. This Section describes the installation of erosion and sedimentation control for stabilized construction exits utilized during construction and prior to the final development of the site.

1.2 REFERENCE STANDARDS

A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM).

C. ASTM D 4632 - Standard Test Method for Breaking Load and Elongation of Geotextile (Grab Method).

1.3 SUBMITTALS

A. Manufacturer's catalog sheets and other pertinent information on geotextile fabric.

B. Sieve analysis of aggregates conforming to requirements of this Section.

PART 2 - PRODUCTS

2.1 SEPARATION GEOTEXTILE

A. Provide woven or nonwoven geotextile fabric made of either polypropylene, polyethylene, ethylene, or polyamide material.

B. Geotextile fabric: Minimum grab strength of 200 psi in any principal direction (ASTM D-4632) and the equivalent opening size between 50 and 140.

C. Geotextile and Threads: Resistant to chemical attack, mildew and rot and shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F.

D. Representative Manufacturers: Mirafi Inc. or preapproved equivalent.

2.2 COARSE AGGREGATES

A. Coarse aggregates shall consist of crushed stone, gravel, crushed blast furnace slag, or combinations thereof. Aggregate 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.

B. Coarse aggregates shall conform to open graded rock 2: to 8" in size.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide stabilized construction roads and access at construction, staging, parking, storage, and disposal areas to keep street clean of mud carried by construction vehicle and equipment. Construct erosion and sediment controls in accordance with Drawings and Specifications requirements.

B. Do not clear grub or rough cut until erosion and sediment control systems are in pace, unless approved by Project Manager to allow soil testing and surveying.

C. Maintain existing construction site erosion and sediment control until acceptance of the project or until removal of existing system is approved by Project Manager.

D. Regularly inspect, repair or replace components of stabilized construction access. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials offsite.

E. Remove and dispose sediment deposits at the project designated spoil site. If a project spoil site is not designated on the Drawings, dispose of sediment offsite at location not in or adjacent to stream or floodplain. Assume responsibility for off-site disposal.

F. Equipment and vehicles of the Contractor, or on-site for his use, shall be prohibited from maneuvering on areas outside of the construction limits. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.

3.2 CONSTRUCTION MAINTENANCE

A. Provide stabilized exits, entrances, access roads, parking areas, and other on-site vehicle transportation routes where shown on the Drawings.

B. Provide stabilized construction access and vehicle washing areas, when approved by Project Manager, or sizes and at locations shown on Drawings or as specified in this section.

C. Clean tires to remove sediment n vehicles leaving construction areas prior to entering public rights-of-way. Construct wash areas needed to remove sediment. Release wash water drainage swales or inlets protected by erosion and sediment control measures.

D. Details for stabilized construction exit are shown on the Detail herein or as shown on the Drawings. Maintain minimum roadway widths of 14 feet for one-way traffic and 20 feet for two-way traffic and of sufficient width to allow ingress and egress. Place geotextile fabric as permeable separator to prevent mixing of coarse aggregate with underlaying soil. Limit exposure of geotextile fabric to elements between laydown and cover to a maximum 14 days to minimize potential damage.

E. Grade roads and parking areas to provide sufficient drainage away from stabilized areas. Use sand bags, gravel, boards, or similar methods to prevent sediment from entering area roadways, receiving stream or storm water conveyance system.

F. Inspect and maintain stabilized areas daily. Provide periodic top dressing with additional coarse aggregates to maintain the required depth. Repair and clean out damaged measures used to trap sediment. All sediment spilled, dropped, washed, or tracked onto area roadways shall be remove immediately.

G. The length of the stabilized area shall be as shown on the Detail or as shown on the Drawings, but not less than 50 feet in length. The thickness shall not be less than 8 inches. The width shall not be less than full width of all points of ingress or egress.

H. Stabilization for other areas shall have the same thickness, and width requirements as the stabilized construction exit, except where specified otherwise on the Drawings.

I. Stabilized area may be widened or lengthened to accommodate truck-washing area as

required by the Contractor and approved by Project Manager.

END OF SECTION 01 57 13.15

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 form 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.

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 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.
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.

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 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, 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

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.

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.

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.
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.

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.

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

SECTION 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 STORM WATER POLLUTION PREVENTION PLAN

A. The Storm Water Pollution Prevention Plan (SWPPP) is part of the Contract Documents and is bound into this Project Manual.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 INFORMATIONAL SUBMITTALS

A. Storm Water Pollution Prevention Plan (SWPP): Within 15 days of date established for commencement of the Work, submit completed SWPPP.

B. EPA authorization under the EPA's "2017 Construction General Permit (CGP)."

C. Storm water Pollution Prevention (SWPP) Training Log: For each individual performing Work under the SWPPP.

D. Inspection reports.

1.4 QUALITY ASSURANCE

A. Storm water Pollution Prevention Plan (SWPPP) Coordinator: Experienced individual or firm with a record of successful water pollution control management coordination of projects with similar requirements.
   1. SWPPP Coordinator shall complete and finalize the SWPPP form.
   2. SWPPP Coordinator shall be responsible for inspections and maintaining of all requirements of the SWPPP.

B. Installers: Trained as indicated in the SWPPP.

PART 2 - PRODUCTS

2.1 TEMPORARY STORMWATER POLLUTION CONTROLS

A. Provide temporary storm water pollution controls as required by the SWPPP.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with all best management practices, general requirements, performance requirements, reporting requirements, and all other requirements included in the SWPPP.

B. Locate storm water pollution controls in accordance with the SWPPP.

C. Conduct construction as required to comply with the SWPPP and that minimize possible contamination or pollution or other undesirable effects.
   1. Inspect, repair, and maintain SWPPP controls during construction.
      a. Inspect all SWPPP controls not less than every seven days, and after each occurrence of a storm event, as outlined in the SWPPP.

D. Remove SWPPP controls at completion of construction and restore and stabilize areas disturbed during construction.

3.2 NOTICE OF INTENT / CERTIFICATION REQUIREMENTS

A. The Contractor shall execute, along with the Contract Documents, a Contractor/Subcontractor Certification, which shall identify the responsibilities for construction activity during the contract. Each Subcontractor's responsibility with regard to the SWPPP shall be identified.

B. The Contractor shall be responsible for signing the certification statement of the NOI. A copy of the NOI form is included as part of this section.

C. A copy of the NOI shall be posted in a prominent place for public viewing at the project site. The Contractor shall be responsible for execution of all documents and providing all inspections and certifications outlined in the SWPPP as necessary for compliance with federal, state and local guidelines.

D. The executed Notice of Intent shall be sent to:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality
Storm Water & General Permits Team; MC-148
P.O. Box 13087
Austin, Texas 78711-3087

3.3 RETENTION OF RECORDS

A. The Contractor shall retain a copy of the SWPPP from the date that it became effective to the date of project completion.

B. Contractor shall retain copies of all inspection and maintenance reports, as well as copies of all modifications and adjustments to the SWPPP until the date of project completion.

C. Contractor shall return to the Owner, all records stated above at the completion of the project. Owner will retain all SWPPP records and data for a period of three (3) years from the date project completion.

3.4 REQUIREMENTS

A. The following notices are to be posted from the date that the SWPPP goes into effect until the date of final stabilization:

1. Copies of the Notice of Intent, submitted by the Owner and General Contractor, along with the Project Description Form of the SWPPP, are to be posted at the construction site or at the Contractor's office in a prominent place for public viewing.
2. Notice to drivers of equipment/vehicles to stop, check, and clean tires for debris and mud before equipment/vehicles are allowed to enter traffic lanes are to be posted at every stabilized construction exit area.
3. Notice of waste disposal procedures are to be posted at a location onsite.
4. Notice of hazardous material handling and emergency procedures are to be posted with the NOI on site. Copies of Material Safety Data sheets are to be kept at a location onsite that is clearly made known to all personnel.
5. A copy of the signed Certification forms included in this Section shall be kept at the construction site or at the Contractor's office.

B. Construction may not begin until 60 days after the NOI is filed.

C. Construction sites that will disturb 10 acres or more shall meet current numeric discharge limit requirements.

D. If earth disturbance will be stopped for 14 days or more, the contractor must immediately stabilize the area using straw or hydraulic mulch, soil binders, erosion control blankets, or hydroseeding.

3.5 NOTICE OF TERMINATION

A. A Notice of Termination (NOT) of Coverage under the TPDES General Permit for Storm Water Discharges Associated with Industrial Activity and storm water run-off from the construction activities does not cause sediment transport or erosion from the site. The A/E and inspector will make final determination of the final stabilization. Final stabilization is when all soil-disturbing activities at the site have been completed and when a uniform perennial vegetative cover with a density of 85% of the cover for unpaved areas has been established. The Contractor will be required to maintain structural controls until this vegetative cover meets the above requirement.

END OF SECTION 01 57 23

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Substitution Procedures" for requests for substitutions.
4. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in “Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 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.
    4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   2. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product. 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.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.
   4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

PART 3 EXECUTION (Not Used)

End of Section 01 60 00

SECTION 01 61 16 VOLATILE ORGANIC COMPOUND VOC CONTENT RESTRICTION

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.scscertified.com.

1.4 SUBMITTALS

A. See Section 01 33 00 - Administrative Requirements, for submittal procedures.

B. Evidence of Compliance: Submit for each different product in each applicable category.
    1. Identify evidence submittals with the words "LEED Report".
C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
D. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of their products, or 2) that such products used comply with these requirements.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.1 MATERIALS

A. All VOC-Restricted Products: Provide products having VOC content of types and volume not greater than those specified.
    1. Product data submittals showing VOC content are NOT acceptable forms of evidence.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

End of Section 01 61 16

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.

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.

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, 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 p reparation 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 stablished by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, ill 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.

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.
    1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
    2. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
B. Temporary Support: Provide temporary support of work to be cut.
C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even- plane surface of uniform appearance.
   5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.
   6. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials

from adjacent finished surfaces. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.
B. Coordination: Coordinate construction and operations of the work with work performed by owner's construction personnel.
   1. Construction Schedule: Inform owner of contractor's preferred construction schedule for owner's portion of the work. Adjust construction schedule based on a mutually agreeable timetable. Notify owner 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.

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 covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, whether completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

L. During Construction:

1. Oversee cleaning and ensure that building(s) and ground(s) are maintained free from accumulations of waste materials and rubbish.
2. Sprinkle dusty debris with water.
3. During progress of Work, clean-up site and access and dispose off waste materials, rubbish and debris at least once every week.
4. Provide dump containers and locate on site for collection of waste materials, rubbish and debris on a daily basis.
5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
6. Remove waste materials, rubbish and debris from site and legally dispose off at public or private dumping area.
7. Lower waste materials in controlled manner with as few handlings as possible; do not drop or throw materials from heights.
8. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
    1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
B. Restore permanent facilities used during construction to their specified condition.
C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

End of Section 01 73 00

SECTION 01 73 29 CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other work.

1.2 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements 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 results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
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.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure. Division 01 General Requirements Tender Documents-Specifications
7. Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General - Except as otherwise indicated or as directed by Engineer, use materials for cutting and patching that are identical to materials being cut and patched. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal or better performance characteristics.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before starting work, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

1. Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.
2. After uncovering work, examine conditions affecting installation of product or performance of work.
3. Report unsatisfactory or questionable conditions to Engineer in writing; do not proceed with work until Engineer has provided further instructions.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing 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.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas

3.3 PERFORMANCE

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. 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.

C. Temporary Support: Provide temporary support of work to be cut.

D. 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.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 - Project Summary.

F. 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 or prevent interruption to occupied areas.

G. 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. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
   4. 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.
   5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
   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.
   4. Ceilings: Patch, repair, or rehang 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 weathertight condition and ensures thermal and moisture integrity of building enclosure.

3.4 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

END OF SECTION 01 73 29

SECTION 01 74 23 FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.02 SUMMARY

A. Keep premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.

B. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all exposed surfaces including crawl spaces; leave project clean and ready for occupancy.

C. Maintain project in accord with State and Local safety, health and insurance standards.

1.03 RELATED WORK IN OTHER SECTIONS

A. Temporary Protection

B. Finish Materials: Various other Sections

PART 2 - MATERIALS

2.01 GENERAL REQUIREMENTS

A. Cleaning materials: Use cleaning materials recommended by manufacturer of surface to be cleaned.

PART 3 - EXECUTION

3.01 HAZARDS CONTROL

A. Store volatile waste in covered metal containers, and remove from premises daily.

B. Prevent accumulation of waste, which creates hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.

3.02 DISPOSAL

A. Salvageable materials, including but not limited to, fill, riprap, road materials, etc. identified to be retained by Owner will be delivered to location designated. Remove other waste materials, debris and rubbish from site and legally dispose of in dumpster provided.

B. Do not burn or bury rubbish and waste materials on project site.

C. Do not dispose of volatile waste such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

D. Do not dispose of waste into streams or waterways.

E. Do not dispose of excess concrete on the project site.

3.03 DUST ABATEMENT

A. Wet down materials and rubbish to lay dust and prevent it from blowing.

3.04 SITE CLEANING/APPEARANCE

A. All walks, drives and streets outside the construction fence shall be kept clean of dirt, mud, debris, building materials, etc. at all times.

B. The Contractor will immediately clean any mud tracked out of the construction area by vehicles or equipment.

C. The Contractor will keep the entire construction area clean and at least weekly, conduct a general clean up operation.

D. The Contractor will keep the grass/weeds cut at all times within limits of construction. Minimum time interval during growing season is two weeks.

E. Periodically inspect, tighten and realign construction/tree protection fencing.

3.05 CONTAINERS AND HANDLING

A. Provide on site containers for collection of waste materials, debris and rubbish. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

3.06 SPECIAL REQUIREMENTS

A. Owner’s waste containers located inside or outside of construction limits will not be used by the Contractor, or covered, fenced in or otherwise made inaccessible for use by the Owner’s forces.

3.07 FINISH WORK

A. Vacuum clean interior areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for beneficial occupancy or final acceptance.

B. Verify any Owner final cleaning and finishing requirements such as floor cleaning and waxing.

3.08 REPAIRS

A. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.

3.09 EXISTING AREAS

A. Existing areas of building interior and exterior which are outside contract limits, but are soiled as a result of the work under this Contract, shall be cleaned and restored to original condition.

END OF SECTION 01 74 23

SECTION 01 77 00 -1 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.

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 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 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

General Contractor - Closeout Checklist

Not Applicable Items are to be Noted in the Remarks Column

Template Revised 8/10/2022

To: Daniel Bankhead, Executive Director of Design and Construction **Date:**

GC: **A/E Firm:**

PKG#: **PM:**

School Name:

Project Type: ☐ Addition ☐ Renovations ☐ New Construction

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks	Req'd of JOC under $50K
	SUBSTANTIAL COMPLETION REQUIREMENTS - Closeout and Punch List Items are NOT to be billed at Substantial Completion				
a.	Fire Alarm System Components Completed	GC			X
b.	Local Fire Marshal Approval Certificate	GC			X
c.	HVAC Air and Water Balancing Completed	GC			X
d.	Energy Management Systems Completed	GC			X
e.	Communications Equipment and Telephone Systems Completed	GC			X
f.	Final Lockset Cores Installed	GC			X
g.	Room Plaques and Exterior Signage Completed	GC			X
h.	Owner Demonstrations and Training Completed	GC			X
i.	Exterior Clean-up and Landscaping Completed	GC			X
j.	Final Interior Clean-up Completed	GC			X
k.	Certificate of Occupancy	GC			X
l.	Punch List Report	GC, A/E			X
	FINAL COMPLETION REQUIREMENTS: CLOSEOUT ITEMS TO BE SUBMITTED WITH FINAL PAYMENT - Allowed billable amount on G702: 100% of contract amount mi				
1	**SUBSTANTIAL COMPLETION**				
a.	Certificate of Substantial Completion	PM			X
b.	Signed Off Punchlist	GC			X
2	**WARRANTIES**				
a.	List of Subcontractors and Suppliers	GC		Include Name, Address, Phone Number and Discipline	X
b.	Contractor's 1 year Warranty	GC			X
c.	Subcontractors' 1 year Warranties	GC			
d.	Manufacturers' Warranties	GC		A separate "Warranties" manual should be provided for guarantees, warranties, etc.	X

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks	Req'd of JOC under $50K
3	**EVIDENCE OF PAYMENT OF DEBTS AND CLAIMS**				
a.	"Contractor's Affidavit of Payment of Debts and Claims" (Confirm GC and Sub Lien Waivers are attached to form.)	GC			
b.	"Contractor's Final Affidavit of Release of Liens"; (Confirm GC and Sub Lien Waivers are attached to form.)	GC			
c.	"Consent of Surety Company to Final Payment"; (Confirm that Power of Attorney is attached to form.)	GC			X
4	**INSURANCE**				
a.	Certificate(s) of Insurance, All insurance must be maintained for one year following substantial completion	GC			X
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.	X
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	X
b.	Signed off Transmittal Key transfer (Accessory keys)	GC		Provided by GC and received by Principal or Campus Facilities Supervisor, as applicable.	X
7	**LOCAL AGENCIES APPROVALS (as applicable)**				
a.	Certificate of Occupancy	GC			X
b.	Final Building Inspections/Closed Construction Permits	GC		Green tags colored copies	X
c.	State Fire Marshal's Fire Alarm Inspection Certificate & Testing	GC			X
d.	Storm Water Prevention Pollution Plan (SWPPP)	GC			X
e.	Elevator Inspection Certificate	GC			X
f.	Boiler Inspection Certificate	GC			X
g.	Health Department Inspection Certificate	GC			X
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.	X
b.	Security drawings	GC		Need AHJ approved documents (if applicable)	X
c.	HVAC Controls drawings	GC			X

CSP 26-021 KB 100% CONSTRUCTION DOCUMENTS 10/9/2025

Item #	Document Description	Primary Responsibility	Date Received by PM	Remarks	Req'd of JOC under $50K
d.	Fire Sprinkler System drawings	GC		Need AHJ approved documents.	X
e.	Data Cabling drawings	GC			X
10	**CERTIFICATIONS**				
a.	Certification of Asbestos Free Project: Letter from GC and **A/E**, Letters from Subs	GC, A/E			X
b.	Certification of Lead-Free Potable Water System: Letters from GC and Subs	GC			X
c.	Certification of PCB-Free Project: Letters from GC and Subs	GC			X
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 *SSp1* - Construction Activity Pollution Prevention: **Erosion & Sedimentation Control Plan**	GC			
b.	Materials and Resources *MRp2 & MRc5* - Construction Waste Management: **Const. Waste Mgmt. Plan**	GC			
c.	Materials and Resources *MRc3* - Sourcing of Raw Materials: **Building Product Disclosure & Optimization Calculator (BPDO)**	GC			
d.	Environmental Quality *EQc3* - **IAQ Management Plan for Construction and Preoccupancy Phases**	GC			
e.	Environmental Quality *EQc2* - Low Emitting Materials: **Low Emitting Materials Calculator**	GC			
13	**FINAL COMPLETION**				
a.	Copy of Final Change Order	A/E, GC, PM			X
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			X
	RETAINAGE				
a.	FBISD Retention Release Reduction Worksheet	PM			X
b.	Purchase Order Closure	PC			X
	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)

BP010 Turf and Athletics
Fort Bend ISD
Project #25-005

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

BP010 Turf and Athletics
Fort Bend ISD
Project #25-005

LEAD FREE AFFIDAVIT

I understand that the Fort Bend Independent School District, in order to protect the students, staff and public in general from any unnecessary exposure to Lead, and to comply with the U.S. Code for a "LEAD FREE" drinking water system. "No person may use any pipe, any pipe or plumbing fitting or fixture, any solder, or any flux, after June 19, 1986, in the installation or repair of- (i) any public water system; or (ii) any plumbing in a residential or nonresidential facility providing water for human consumption, that is not LEAD FREE (within the meaning of subsection (d) of this section). [42 USC§ 300g-6]"

I certify that I am familiar with the materials used in the construction of, and incorporated into, the construction described below. I further certify that to the best of my knowledge and belief, no lead containing building materials were used in the process of construction or incorporated into the construction of the drinking water system in the building.

CAMPUS(ES):

SCOPE OF WORK: _____

SPECIFICATION SECTION(S): _____

SUBCONTRACTOR: _____

_____ _____
General Contractor's Signature Date

_____
General Contractor's Printed Name & Title

Failure to complete this waiver constitutes non-compliance with the job specifications and an unacceptable job.

Signed before me this ___ day of _____, 20____

Notary Public: _____

My commission expires: _____

As the architect and/or project engineer responsible for the above said project I certify that no lead containing building materials were specified as a building material in the building as specified in 42 U.S. Code§ 300g-l - National drinking water regulations.

_____ _____
Architect's or Project Engineer's Stamp Signature Date

BP010 Turf and Athletics
Fort Bend ISD
Project #25-005

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

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 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.

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.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
   2. Performance and design criteria if Contractor is delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   6. Normal shutdown instructions.

7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in the manual, identify them by product name, and arrange to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identify by product name and arrange to match manual's table of contents. For each product, list

name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. 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.
B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
    1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
    2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
    1. Do not use original project record documents as part of operation and maintenance manuals.
    2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

End of Section 01 78 23

SECTION 01 78 39 PROJECT 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.

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:
    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.

B. Format: Submit record Product Data as a paper copy as well as scanned PDF electronic file(s) of marked up paper copy.
   1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

PART 3 EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

End of Section 01 78 39

SECTION 01 79 00 DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.
   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.

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, a nd 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:
        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 r equirements in Division 01 Section "Operations and Maintenance Data."
B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish an instructor to describe Owner's operational philosophy.
   2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
    1. Schedule training with Owner'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 00 DEMOLITION

PART 1 - GENERAL REQUIREMENTS

1.01 SCOPE

A. The work covered by this section of the specifications consists of furnishing all labor, material, and equipment necessary to perform all operations in connection with the removal of various existing materials, finishes, etc. to permit the installation of all new work in strict accordance with these specifications and the applicable drawings.

B. 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.

C. Prior to any demolition or renovation on any school district property the Contractor / Construction Manager shall verify that the Owner has provided written notification to the Texas Department of Health, Toxic Substances Control Division, Asbestos Programs Branch as follows:

D. "The Texas Department of Health (department) shall be notified on a form specified by the department of any asbestos abatement activity, renovation or operations and maintenance (O&M) activity affecting asbestos-containing material (ACM), or any demolition in facilities or public buildings. Notification shall be made to the department no less than 10 working days (not calendar days) prior to commencement of the activity and shall be submitted on the form specified by the department. It is a requirement that the department notification form be filled out completely and properly … National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements apply equally to both the NESHAP and Texas Asbestos Health Protection Act (TAHPA) notification requirements…"

E. It is impractical to show and specify the remodeling and patching in minute detail. It is the intent of this specification that all remodeled spaces be neatly finished, consistent with the function and use of each area. It shall be incumbent upon each and every bidder to visit and inspect the site and particularly the existing buildings in order to familiarize himself with the conditions under which he must work. Bidders are hereby advised that no "extra charges" will be allowed for failure to understand or comply with the foregoing conditions.

F. In addition to the patching and finishing that is required by alterations and renovations included in his work, the general contractor shall do all patching and finishing that will be required as a result of the work done by the mechanical and electrical contractors in the existing building. All new patches and finishes, unless otherwise scheduled, shall match the existing conditions and finishes and all work shall be done by mechanical normally employed for the particular classification of the work and materials involved and in accordance with the applicable sections of these specifications. All patching shall be neatly executed with surfaces flush and textured the same as adjoining work. Mechanical and electrical work, when partially deleted, shall be terminated within a partition, capped, and covered. Painting shall be as specified for new work and shall include entire wall containing remodeled work.

G. Selective Demolition Work: The following is a general list of the types of selective demolition required.
1. Saw-cutting and removal of existing concrete paving and flatwork.
2. Saw-cutting and removal of existing concrete foundations.
3. Saw-cutting and removal of existing concrete tilt-wall panels
4. Removal of existing drywall partitions.

5. Removal of existing CMU partitions
6. Removal of existing doors and frames.
7. Removal of existing ceilings.
8. Removal of existing floor and wall finishes.
9. Removal of various existing electrical equipment and fixtures.
10. Removal of various existing mechanical equipment and fixtures.
11. Removal of various existing plumbing equipment and fixtures.

1.02 PERMITS AND ORDINANCES

A. Procure and pay for all necessary permits or certificates required to complete the work specified. Make any and all required notifications and comply with all applicable Federal, State and local ordinances.

B. Strictly adhere to all governing authorities ordinances for proper disposal of all materials removed from the site.

PART 2 - MATERIALS

2.1 GENERAL

A. Materials and equipment used for demolition work section shall be in accordance with industry standards and specifically suited for the task at hand.

B. Where partial existing work is removed and the remaining portion is designed to interface with new work, carefully cut or otherwise remove existing work as required for proper fit and finish to subsequent new work.

C. All existing concrete to be removed shall be saw-cut as required to provide a smooth, vertical edge to tie into new adjacent concrete.

D. All existing masonry to be removed shall be saw-cut as required to provide a smooth, vertical edge to tie into new adjacent masonry or other work as indicated on the Drawings.

E. All abandoned water and sewer lines shall be removed back to a concealed location and capped.
1. At Slab Conditions: below slab. Cut and patch as required.
2. At Drywall Partitions: behind gyp board panel. Cut and patch as required.
3. At CMU Walls: behind CMU or back to CMU cavity where pipe runs in cavity. Cut and patch as required.
4. At Ceiling Conditions: to above finished ceiling panel. Cut and patch as required.

F. Field verify existing conditions and coordinate with other trades as required to include the full scope of work required.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

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/Engineer.

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 measured drawings, preconstruction photographs, preconstruction videotapes and templates.

1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

H. Protection: The contractor shall be responsible for the owner's property that may be damaged by his operations and he shall provide and maintain all methods of necessary protection. If damage does occur, he shall be responsible to correct and bring back damaged area to previous existing or better condition, including adjacent area so repaired area does not look patched.

I. The contractor shall take precaution in all demolition work and provide all necessary barricades, shoring, scaffolding, etc. to protect all personnel and the building. Contractor shall meet OSHA and all other local, state, and national safety standards and codes.

J. Demolition / Renovation: Contractor shall provide all demolition work necessary to remove, cut, or otherwise prepare areas for changes required by new work. All demolition work shall be under supervision of qualified, experienced personnel knowledgeable with demolition procedures and techniques and with scope of work required.

1) The contractor shall leave all chases, holes, or openings of proper size and shape in his work as may be necessary for the proper installation of his own or other contractors' work and shall consult with other contractors regarding proper locations and sizes. Excessive cutting will not be permitted nor shall any structural members be notched or cut unless so specifically shown on the drawings or unless such cutting is authorized, in writing, by the structural engineer.

2) Contractor shall completely repair any existing chases, access holes, conduit or plumbing access holes or existing hidden surfaces to be visible after demolition caused by removed or demolished work. Areas shall be completely repaired, patched, finished with all visible areas painted to match surrounding areas.

3) After such work has been installed, the contractor shall carefully fit around, close up, repair, patch, and point up such openings. All such work shall be done with proper tools by careful workmen of the particular trade to which the respective type of work belongs. Each contractor shall build into his own work, as directed, any and all items required to be furnished by other. Repair work where demolition has occurred shall match surrounding area materials, finishes, textures, color, etc.

K. Debris: All debris resulting from the work included under this contract shall be removed from the building, stacked in designated areas, and removed from the site as the work progresses. At no time shall refuse be allowed to cause a hazardous or unsightly condition.

L. Openings through existing roof, when required, shall be waterproofed to insure that water does not leak into building and shall be done in such a manner as required by roofing manufacturer to keep existing roofing warranties and guarantees in place with no reduction or voiding of any provision of warranty.

M. Salvage or Removed Materials and Equipment:

1) See plans for items removed and reinstalled by contractor. Contractor shall verify with owner which other items are to be removed and shall be removed by the contractor at the proper sequence of construction and delivered to the owner.

2) Salvage of Removed Material:

a. The Owner reserves the right to claim all material / equipment removed under this contract.

b. Prior to the start of demolition work, the Contractor shall contact the Owner to determine what, if any, materials and / or equipment removed are to be salvaged for Owner's retention.

c. All other materials and equipment being removed by this contractor shall become the property of the contractor and shall be removed from the premises. The salvage value of this material and equipment shall be incorporated in the contractor's cost computations and shall be reflected in his bid for this project.

N. Disposition of Removed Material: All material removed under this Contract, which is not to be salvaged or reused, shall become the property of the Contractor and be promptly removed from the site. Do not store or permit debris to accumulate on the site.

O. The Contractor shall review the contract documents as they relate to selective demolition. Items that will interfere with new Work shall be removed as required to coordinate with the new Work.

P. Clean-Up: On completion of demolition work, leave property and adjacent areas clean and satisfactory to local authorities and the Architect.

Q. For disruption of services (such as water, electricity, sewage, etc.) to the existing building, the contractor shall receive written approval and coordinate with owner. Any service interruption at any time must bed arranged at a time approved by the owner.

R. All partial demolition at existing concrete work shall be performed by saw-cutting or removal back to a full-depth concrete joint; as required to provide a clean interface with new concrete tying into existing concrete work to remain.

S. At areas of partial demolition, where remaining existing work is to tie into new Work, conduct demolition as required to provide proper interface between existing work to remain and new Work.

T. Where existing work is shown to be removed and re-used (i.e. masonry), carefully remove such work and preserve in a condition suitable for reinstallation.

3.2 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.

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.

3.3 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 00

SECTION 02 41 13 SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Partial demolition of existing building as required to accommodate additions and renovations as shown on the drawings or required. Include removal of existing utilities as indicated or encountered; removal of masonry, and mechanical, electrical, and plumbing items as indicated or required.

1.2 SUBMITTALS

A. Submit the following items.

1. Itemized Demolition Schedule.
2. Detail all demolition methods to be used.

1.3 PERMITS

A. Procure and pay for all necessary permits or certificates required to complete the work specified. Make any and all required notifications and comply with all applicable Federal, State and local ordinances.

1.4 QUALITY ASSURANCE

A. Provide at least one (1) person who shall be present and in charge of the Demolition Work at all times and who shall be thoroughly familiar with all phases of all work performed under this Section.

B. Comply with all pertinent codes and regulations applying to this work.

1.5 JOB CONDITIONS

A. Use all means necessary to prevent the spread of dust during performance of this work. Provide additional clean filters for the existing air handling system serving those areas to remain to protect them from construction dust.

B. Use all means necessary to protect the existing building to remain from all types of damage, including fire, water damage, and unnecessary interruption of utility services. In the event of damage of any kind, immediately make all repairs and replacements necessary to the approval of the Owner at no additional cost to the Owner.

C. Motor driven equipment shall have functional mufflers.

D. Visit the site and examine the existing structure. Note all conditions as to the character and extent of work involved.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all barricades, shoring, and bracing necessary to protect the tenants, workmen, and Public from danger. Barricades shall be sufficiently designed to protect and or exclude the public from all hazards.

B. All other materials, not specifically described but required for proper completion of Work of this Section, shall be as selected by the Contractor subject to the approval of the Owner.

C. The Owner and Architect are not responsible and make no claims for the quality or quantity of the materials being demolished. The General Contractor or subcontractors that undertake or assume the benefits of salvage efforts shall assume all risks associated with that effort.

2.2 DEMOLITION WORK

A. Perform demolition work in manner so as to allow Owner's safe use of existing facility.

B. Perform demolition work in order to maintain Owner's construction schedule.

2.3 REMOVAL OF PARTITIONS, COLUMNS AND STRUCTURE

A. Masonry walls or other sections of masonry shall not be permitted to fall on floors of building in masses to exceed safe carrying capacity of floors. Existing floors shall be properly protected with plywood on both sides of a partition to be demolished.

B. Provide temporary shoring or bracing wherever necessary for the protection of occupants, workmen, walls, partitions, roofs, floors and structure to remain.

C. Structural or load-supporting members shall not be cut or removed adjacent to existing structures to remain until all loads carried by members have been removed or adequately supported.

D. No masonry walls shall be removed until it has been determined that the walls to be removed do not support the roof. To determine this, all adjacent materials such as finish ceilings shall be removed to provide adequate views of existing structure. Provide temporary shoring as needed. The Contractor shall take all precautions necessary to ensure the safety of the demolition workers and all occupants of the building.

E. No demolition will be allowed above, below, adjacent to or near any occupied areas of the building.

F. Where access holes in existing ceilings or removal of existing ceilings are required, minimize the access in order to minimize the repair work and repair or replace removed or damaged work to match adjacent undamaged work.

G. Cut and tooth new openings in masonry where required, of correct size to permit installation of frames and anchors for new doors.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Before commencing the Work of this Section, verify with the Owner that all items to be removed by the Owner have been removed. Schedule the work in a careful manner with all necessary consideration for the Public and the Owner. All items of existing equipment and materials or any other item of value to the Owner shall be salvaged by the Owner prior to demolition.

B. All material removed under this Contract, which is not to be salvaged or reused, shall become the property of the Contractor and be promptly removed from the site. At all times use movable debris boxes, covered, to convey the material through the building. Do not store or permit debris to accumulate on the site. Dumpsters shall not overflow and shall be emptied on a regular basis. Remove all debris from the building premises and leave the construction site "Clean" each day. All debris shall be dumped in an approved disposal facility and all fees for this shall be paid by the Contractor. Contractor is responsible for completely removing all demolished materials from the site and disposing of them in accordance with all local, State

and Federal Regulations. If Contractor fails to remove debris promptly, Owner reserves the right to have debris removed at Contractor's expense.

C. Conduct operations so as not to interfere with adjacent occupied spaces, roads, streets, drives, walks, service lines and the like.

D. Keep all pedestrian areas clear for passage at all times.

E. Where existing pavement is to remain, make straight saw cuts in existing pavement to provide clean breaks prior to removal. Do not break concrete pavement or base with drop hammer unless concrete or base has been saw cut to minimum depth of two (2) inches.

F. Remove sidewalks and curbs to nearest existing dummy, expansion, or construction joint.

G. Where existing end of pipe culvert or end of sewer is to remain, install 8-inch-thick masonry plug in pipe end prior to backfill.

H. When removing existing utilities or structures, all existing backfill material (i.e. cement stabilized sand) shall also be removed. Include in price of utility or structure removed.

3.2 BACKFILL

A. Backfill of removal areas shall be in accordance with requirements of Division 31.

B. Trench and structure excavations shall be backfilled in 8" lifts and compacted to 95% of the Std. Proctor Density. Reference Geotechnical Report for details regarding acceptable backfill.

3.3 DISPOSAL

A. Inlet frames, grates, and plates; and manhole frames and covers, may remain property of the owner. Disposal shall be in accordance with requirements of Division 1.

B. Remove from site, debris resulting from work under this section in accordance with requirements of Division 1.

3.4 PROTECTION OF STRUCTURES, PROPERTY

A. Execute demolition work to ensure adjacent property no damage from falling debris or other causes.

B. Take precautions to guard against movement, settlement, or be liable for such movement, settlement, or collapse; repair promptly such damage when so ordered.

C. Repair damage to Owner's property or any other person or persons on or off premises by reason of required work.

END OF SECTION 02 41 13

SECTION 03 01 30 CONCRETE REHABILITATION

PART 1 – GENERAL REQUIREMENTS

1.1 SECTION INCLUDES

A. Repair and patching of minor, non-structural blemishes, pits, depressions, etc. in existing concrete using two component polymer modified cementitious repair mortar.

1.2 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with specified requirements, including technical data on product characteristics, performance, and limitation criteria.
2. Manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with minimum five (5) years experience in manufacturing the products specified in this Section.

B. Applicator Qualifications: Firm with minimum three (3) years experience in the application of the products specified in this Section.

1.4 PRE-INSTALLATION CONFERENCE

A. Refer to Division 1 – Project Coordination

1.5 DELIVERY, STORAGE AND PROTECTION

A. Material Delivery: Deliver materials to the job site in original sealed containers, clearly marked with manufacturer’s name, brand name, and type of material and color or color formula. Verify the product matches that of the original Architect approved sample or mock-up.

B. Storage and Protection: Store materials inside if possible, away from sparks and open flame. Store in a secure area to avoid tampering and contamination. Water based materials must be kept from freezing. Store and handle according to manufacturers written instructions.

C. Condition products to 70 degrees F plus or minus 5 degrees for use per manufacturer's instructions.

1.6 WARRANTY

A. Warrant the Work specified herein for five (5) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
1. Noticeable deterioration of finish.
2. Chalking or dusting excessively.
3. Changing color in irregular fashion, staining or discoloring, including efflorescence.
4. Cracking or spalling.

5. Releasing from substrate.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Specifications are based on named products manufactured by Euclid Chemical. Other manufacturers must have a minimum of ten (10) years experience manufacturing products meeting or exceeding the specifications, comply with Division 1 requirements regarding substitutions, and have Architect's approval prior to be considered.
   1. BASF Building Systems
   2. Euclid Chemical Company, Kirkland, IL

2.2 MATERIALS

A. Polymer-modified Portland cement repair mortar containing blend of selected Portland cements, specially graded and light weight, spherical aggregates, water-reducing agents, admixtures for control of set time and shrinkage to produce trowel grade mortar. Flowable Repair Mortar for horizontal patches and repairs to 1" thick per lift. Apply in multiple one-inch lifts with different aggregate profiles as required to achieve total required thickness as recommended by manufacturer.

B. Material shall have the following properties:
   1. Compressive Strength minimum 5,000 psi 28 days per ASTM C 109
   2. Flexural Strength minimum 900 psi at 28 days per ASTM C 348
   3. Linear Shrinkage maximum -0.0011% at 28 days per ASTM C 157
   4. Freeze Thaw Resistance of 300 Cycles…99.4% dynamic modulus per ASTM C666
   5. Volumetric Resistivity maximum of 15,000 ohm/cm
   6. Product:
      a. Euclid Chemical Company; Tammspatch II, or approved equal.

B. Manufacturer shall have ISO 9001 Quality Certification. To ensure compatibility all admixtures shall be from the same manufacturer.

C. To ensure compatibility bonding agent and curing compound shall be used and shall be from same manufacturer as repair mortar.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect adjacent Work areas and finish surfaces from damage during preparation and application.

B. Remove all floor finishes in work area and mechanically abrade surface with chipping hammer, shot peen, chisel, sandblast, or other manufacturer recommended surface preparation means.

C. Prepare concrete to CSP Profile (ICRI Standards) as stated in Product Data Guide with fractured aggregate profile to ensure proper adhesion.

D. Clean any exposed steel to white metal finish and prime with primer acceptable to product manufacturer. Chip back behind reinforcing steel if at least 1/2 rebar diameter is exposed so

that area chipped behind rebar will be equal to or greater than minimum thickness depth of polymer modified repair material.

E. Saw-cut straight edge along new location of ramp toe and intermediate landing a minimum of 1/4 inch deep to eliminate featheredges and some material thickness at final application.

F. Dampen base concrete interface to be repaired to Saturated Surface Dry (SSD) conditions by wetting, fogging, or ponding with clean water for 24 hours.

3.2 APPLICATION

A. Apply materials in strict accordance with manufacturer's instructions. Provide multiple lifts as required for material thickness limitations. Consult manufacturer for aggregate profiles for building up thickness and for finish lift smoothness.

B. Mixing:
1. Using mechanical mixer, mix patching material with clean water in clean container at rates instructed by manufacturer. Sift powder into container in thirds. Mix continuously at slow speed to avoid air entrainment. Mix for minimum of 3 minutes. Mix will appear dry until full mix time is accomplished.
2. Mix no more material than can be placed in 20 to 30 minutes at 70 degrees F and 50 percent relative humidity.

C. Materials must be applied using the proper application technique used on the approved Architect's sample or mock-up.

D. Apply materials evenly until a uniform color and appearance is achieved.

E. Placement:
1. Dampen surface with clean water to obtain saturated surface-dry (SSD) with no standing water.
2. Brush-apply a small quantity of mixed patching material as a scrub coat to prepared substrate. Thoroughly key-in and work material throughout cavity to promote bond.
3. If scrub coat dries out before wet mortar can be places, remove scrub coat similar to laitance removal.
4. Place repair mortar onto wet scrub coat using brush with firm trowel pressure. Completely fill voids around steel reinforcement. Key in and compact thoroughly to secure bond. Apply patching material in lifts of 1/4 inch to 2 inches and trowel to desired finish promptly after placing material.
5. Avoid featheredging. For optimum mechanical bond on successive lifts, thoroughly score each lift and allow reaching initial set before next layer is applied.
6. Excessive troweling will cause discoloration.
7. Trowel to smooth finish after initial set.

F. Curing:
1. Wet cure patch when temperatures are above 85 degrees F or relative humidity is below 30 percent or wind speed exceeds 15 mph or patches are exposed to direct sunlight for 72 hours after placement.
2. Cure patches with special curing compound if temperatures are above 85 degrees F, relative humidity is below 30 percent, wind speed exceeds 15 mph, or patches exposed to direct sunlight for 72 hours after placement only if wet curing cannot be accomplished or as directed by Architect. Do not use solvent-based curing compounds.

3.3 FIELD QUALITY CONTROL

A. Architect shall be contacted 48 hours prior to application so as to provide observation as required. The Architect or his Representative shall observe the progress as the work proceeds. Do not apply any material that is not specified or approved by the Architect.

3.4 CLEANING

A. At completion of work, remove all excess material, debris, and waste resulting from the Work of this Section from the job site. Dispose of containers according to state and local environmental regulations.

END OF SECTION 03 01 30

SECTION 03 30 00 CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

B. Concrete paving and walks are specified in Division 32.

C. Polished Concrete Finishing is specified in Section 03 35 43.

D. Special requirements for Tilt-up Concrete Construction are specified in Section 03 47 13,

1.2 DESCRIPTION OF WORK

A. Extent of concrete work is shown on drawings, including schedules, notes and details which show size and location of members and type of concrete to be poured. Furnish all labor, materials, services, equipment and hardware required in conjunction with or related to the forming, delivery and pouring of all poured-in-place concrete work.

1.3 QUALIFICATIONS

A. The concrete supplier shall have a minimum of two years of experience in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment. The supplier must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

B. The concrete contractor shall have a minimum of two years of experience with installation of concrete similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful -service performance.

C. Any testing laboratory retained to run certain tests required by this specification shall meet the basic requirements of ASTM E 329.

1.4 QUALITY CONTROL

A. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

B. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:
1. ACI 301, "Specifications for Structural Concrete for Buildings."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 318, "Building Code Requirements for Structural Concrete."
4. CRSI, "Manual of Standard Practice."

C. Document Conflict and Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect/Engineer prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect/Engineer.

D. Inspection and Testing of the Work: Materials and installed work may require testing and retesting, as directed by the governing building code or the Architect/Engineer, at any time during progress of work.

1. The Contractor shall provide adequate notification to the Owner's Testing Agency of construction operations including the project schedule to allow the Testing Agency to schedule inspections. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory that may be back-charged to the Contractor by the Owner.
2. The Contractor shall cooperate with laboratory personnel, provide access to the work, and to manufacturer's operations.
3. The Contractor shall make adequate arrangement with the Owner's Testing Agency for inspection of material stockpiles and facilities.
4. The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.
5. The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.
6. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents. Tests not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense. See Testing Laboratory section of the Specifications.

E. Acceptance Criteria for Concrete Strength: The strength level of an individual class of concrete shall be considered satisfactory if both the following requirements are met:
1. The average of all sets of three consecutive strength tests equal or exceed the required f'c.
2. No individual strength test falls below the required f'c by more than 0.1 f'c or 500 psi, whichever is greater.
3. A strength test shall be defined as the average strength of two 6" x 12" cylinder breaks or three 4" x 8" cylinder breaks tested at the strength age indicated on the drawings for that class of concrete.

F. Responsibility for Selection and Use of Concrete Admixtures and Chemical Treatments: The Contractor shall be responsible for selecting admixtures and surface treatments that are compatible with the intended use of the concrete including all final surface treatments called for within this or other specifications or on the structural or architectural drawings. The Contractor is responsible for following the manufacturer's instructions for the use of their product including abiding by any limitations placed by the manufacturer on the use of any of its products.

G. Survey for Anchor Rods: The Contractor shall use a qualified, licensed land surveyor to lay out the proper location of all embedded anchor rods for columns above before they are encased in concrete. The surveyed locations of such elements shall be submitted to the Architect/Engineer for record.

H. Manufacturer Representative Presence:
1. Post-installed anchors: The manufacturer's representative for each post-installed anchor product (adhesive, expansion, undercut, screw, or insert anchor) shall be present during the first day's installation of the product to observe whether the anchors are installed according to manufacturer's instructions.
2. Fiber-reinforced concrete: The manufacturer's representative for each fiber type shall be present during the first pour in which the fiber is used to observe whether the dosage rate and placing and finishing method is in accordance with the specifications and the manufacturer's instruction.

1.5 PREINSTALLATION CONFERENCES

A. Pre-Concrete Conference

1. At least 7 days prior to beginning concrete work, the Contractor shall conduct a meeting to review the proposed mix designs and to discuss required methods and procedures to produce concrete construction of the required quality. Also review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for materials inspection, testing and certifications. The contractor shall send a pre-concrete conference agenda to all attendees 7 days prior to the scheduled date of the conference.
2. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
   a. Contractor's Superintendent
   b. Laboratory responsible for the concrete design mix
   c. Laboratory responsible for field quality control
   d. Concrete Subcontractor
   e. Ready-Mix Concrete Producer
   f. Admixture Supplier
   g. Concrete Pumping Contractor
   h. Steel Fiber Reinforcement Representative
   i. Owner's and Architect's/Engineer's Representative
3. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:
   a. Owner's Representative
   b. Architect
   c. Engineer-of-Record
4. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least 7 days prior to the scheduled date of the conference.

1.6 SUBMITTALS

A. Shop Drawings: Submit shop drawings for all reinforcing steel and related accessories for the Engineer's approval. Shop drawings shall show arrangement and layout, bending and assembly diagrams, bar schedules, stirrup spacing, splicing and laps of bars and shall be prepared in accordance with CRSI Standards. Submit details for steel templates that are to be used when placing dowels for columns, plinths, or pilasters out of foundation elements or for placing anchor rods for structural steel members.

B. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including admixtures, patching compounds, epoxies, grouts, waterstops, joint systems, fiber reinforcement, curing compounds, dry-shake finish materials, hardeners, sealers, mechanical splices, hooked anchorage systems, dowel bar substitute systems, dowel bar sleeves, and others as requested by Architect/Engineer.

C. Samples: Submit samples of materials specified if requested by Architect/Engineer, including names, sources and descriptions.

D. Mix Designs: Submit mix designs as specified herein.

E. Material and Mill Certificates: Provide material and mill certificates as specified herein and in the Testing Laboratory section of the Specifications. The Manufacturer and Contractor shall sign the material and mill certificates certifying that each material item complies with specified

requirements. Provide certification from admixture manufacturers that chloride ion content complies with specified requirements.

F. International Code Council (ICC) Evaluation Service Reports: Submit evaluation service reports of approval from ICC Evaluation Service, Inc. for mechanical splice, hooked anchorage systems, and dowel bar substitute systems.

G. Construction Joints: Submit drawing of proposed construction joint locations in concrete for slab on grade. Submit any additional or changed reinforcing that is required at construction joints that differs from that shown on the drawings.

H. Surveys: Submit reports certifying that all anchor rods for columns above are in their proper location prior to placing of concrete.

1.7 PROVISION FOR OTHER WORK

A. Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking, grounds and other fastening devices required for attachment of work. Properly locate in cooperation with other trades and secure in position before concrete is poured. Do not install sleeves in any concrete slabs except where shown on the drawings or upon written approval of the Architect/Engineer.

B. Protect adjacent finish materials against damage and spatter during concrete placement.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Refer to the drawings for classes and strengths of concrete required.

B. Hydraulic Cement:

1. Use ASTM C 150, Type I or Type III, or ASTM C 1157, Type GU or HE unless otherwise specified.
2. Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Architect/Engineer and the Owner's Testing Laboratory. Submit mill certificates certifying conformance to this specification for each brand and type of cement.
3. Testing of cement in lieu of mill certificate submittal will be required if:
   a. The cement has been in storage at the mixing site for over 30 days
   b. It is suspected by the Owner, Architect, Engineer or Owner's Testing Laboratory that the cement has been damaged in storage or in transit or is in any way defective.

C. Fly Ash: ASTM C 618, Class C or F.

D. Normal Weight Aggregates: ASTM C 33 and as herein specified. Submit material certificates from aggregate supplier or test results from an independent testing agency certifying conformance to this specification for each source of aggregate.

E. Lightweight Aggregates: ASTM C 330. Submit material certificates from aggregate supplier or test results from an independent testing agency certifying conformance to this specification for each source of aggregate.

F. Water: Comply with the requirements of ASTM C 1602.

G. Cementitious materials, aggregate, and water must be extracted or recovered as well as manufactured within 500 miles of the project site.

H. Air-Entraining Admixture: ASTM C 260. Provide air entrainment as specified in Table 4.2.2.4.of ACI 301-05 in all concrete exposed to freezing and thawing. Interior steel troweled surfaces subjected to vehicular traffic shall not have more than 3% entrained air. Surfaces scheduled to receive hardeners shall not have more than 3% entrained air.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
   a. W.R. Grace & Co.; Darex or Daravair series.
   b. BASF Admixtures, Inc.; MB-VR, MB-AE90, or Micro-Air.
   c. Sika Corporation; Sika AER.
   d. The Euclid Chemical Company; Air Mix or AEA-92.
   e. The Euclid Chemical Company; Eucon Air 30 or Eucon Air 40.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

I. Water-Reducing Admixture: ASTM C 494, Type A. See maximum permissible chloride ion content in concrete specified below.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
   a. BASF Construction Chemicals; Pozzolith series.
   b. Sika Chemical Corp.; Plastocrete 161.
   c. The Euclid Chemical Company; Eucon WR-75 or WR-91.
   d. W.R. Grade & Co.; WRDA series.
   e. The Euclid Chemical Company; Eucon NW or Eucon LW.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

J. Mid-Range Water-Reducing Admixture: ASTM C 494, Type A and Type F. See maximum permissible chloride ion content in concrete specified below.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
   a. BASF Construction Chemicals; Polyheed series.
   b. The Euclid Chemical Company; Eucon MR.
   c. Sika Chemical Corp.; Sikament HP.
   d. W.R. Grade & Co.; Daracem or Mira series.
   e. The Euclid Chemical Company; Eucon X-15 or Eucon X-20.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

K. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F or Type G. See maximum permissible chloride ion content in concrete specified below.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
   a. W.R. Grace & Co.; ADVA or Daracem Series.
   b. BASF Construction Chemicals; Rheobuild 1000 or Glenium series.
   c. Sika Chemical Corp.; Sikament.
   d. The Euclid Chemical Company; Eucon 37/1037 or Plastol series.
   e. The Euclid Chemical Company; Eucon SP or Eucon RD2.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

L. Water-Reducing, Accelerator Admixture (Non-Corrosive, Non-Chloride): ASTM C 494, Type C or E. See maximum permissible chloride ion content in concrete specified below.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
a. W.R. Grace & Co.; Polarset, Gilco, Lubricon NCA, Daraset 400, or DCI.
b. BASF Admixtures, Inc.; Pozzutec 20+.
c. The Euclid Chemical Company; Accelguard 80/90, NCA, or AcN.
d. Sika Chemical Co.; Plastocrete 161FL.
e. The Euclid Chemical Company; Eucon AcN.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

M. Water-Reducing, Retarding Admixture: ASTM C 494, Type D. See maximum permissible chloride ion content in concrete specified below.
1. Subject to compliance with requirements, provide one of the following products and manufacturers:
a. W.R. Grace & Co.; Daratard series.
b. BASF Construction Chemicals; Pozzolith series or DELVO series.
c. Sika Chemical Co.; Plastiment.
d. The Euclid Chemical Company; Eucon Retarder series.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures to be used.

N. Corrosion Inhibitor: 30% calcium nitrite
1. Products: Subject to compliance with requirements, provide the following at dosage rates per Engineer of Record from manufacturer's recommendation based on design life, application, clear cover, and other products in concrete mix:
a. The Euclid Chemical Company; Eucon CIA or Eucon BCN.
b. W.R. Grace & Co.; DCI or DCI-S.
c. BASF Construction Chemicals; Rheocrete CNI.
d. Sika Chemical Co.; Sika CNI.

O. Corrosion Inhibitor: Amine-Ester type
1. Products: Subject to compliance with requirements, provide the following at dosage rates per manufacturer's recommendation:
a. BASF Construction Chemicals; Rheocrete 222+.

P. Calcium Chloride and Chloride Ion Content: Calcium chloride or admixtures containing more than 0.5% chloride ions by weight of the admixture are not permitted.
1. Certification: Written conformance to all the above mentioned requirements and the chloride ion content of the admixture as tested by an accredited laboratory will be required from the admixture manufacturer at the time of mix design review by the Engineer. For concrete exposed to sulfate exposure class S2 or S3 as noted on the drawings, admixtures must be completely free of chloride ions.

2.2 REINFORCEMENT MATERIALS
A. Reinforcement:
1. Reinforcing materials shall be delivered from the mill in bundles that are identified as to heat number and manufacturer and accompanied with mill and analysis test reports and an affidavit from the supplier stating that the material conforms with the requirements of the governing ASTM specification listed herein.
2. Deformed bar material that is not identifiable according to the criteria listed above shall be tested for tensile strength and bend tests according to ASTM A 615 on a sample of 2 bars for each ten tons or fraction thereof of unidentified material for each bar size.

The bars shall be a minimum of 24 inches long. Bend tests are not required for #14 and # 18 bars. Submit the results of such tests for record.

3. Reinforcing Steel: Reinforcing steel shall conform to ASTM A 615 Grade 60 as noted on the drawings.
4. Weldable Reinforcing Steel: All reinforcing steel required to be welded shall conform to ASTM A 706.
5. Deformed Bar Anchors: Deformed Bar Anchors shall conform to ASTM A 496 with a minimum yield strength of 75,000 PSI. Standard ASTM A 615 Grade 60 or Grade 40 reinforcing bars may not be substituted for deformed bar anchors.
6. Plain Steel Welded Wire Fabric: Welded plain-steel wire fabric shall conform to ASTM A 185 with a yield strength of 65,000 PSI. Provide in flat sheets only.
7. Joint Dowel Bars: Smooth bars used to dowel across slab-on-grade construction joints shall conform to ASTM A 615, Grade 40 or A36, plain-steel bars. Cut bars true to length with ends square and free of burrs.
8. Dowel Bar Sleeves: Plastic or gage metal (26 ga. min.) sleeves with an inside diameter of 1/16 inch greater than the dowel bar that it encases, that have the strength, durability, and design to provide free movement of the dowel relative to the concrete slab and that are specifically manufactured for this purpose.
9. Alternate Slab-on-Grade Joint Load Transfer Systems: A system that consists of flat, ASTM A 36 plate that is saw cut into a square or rectangular shape and is embedded into or encased by a plastic sleeve that allows movement in both lateral directions but not in the vertical direction. Acceptable systems are manufactured by PNA Construction Technologies with products known by the names "Diamond Dowel System" and "PD^3 Basket" and Greenstreak Group Inc. with products known as "Speed Plate' and "Double-Tapered Basket".
10. Tie Wire: Tie wire shall be annealed steel tie wire, minimum 16 gauge. Provide only plastic coated or stainless steel tie wire in exposed concrete structures and all architectural concrete.

B. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type or all plastic supports complying with CRSI recommendations.
   1. Slabs-on-Grade: Use precast concrete bar supports (dobies) or supports with sand plates or horizontal runners designed for use on ground.
   2. Spread Footing Bottom Reinforcement: Use precast concrete bar supports (dobies) or chairs designed for soil-supported slabs.

2.3 SPLICES

A. End Bearing Compression Splices: Members with end bearing compression splices shall have vertical bars saw cut or otherwise finished for true bearing. Bar ends shall terminate in flat surfaces within 1 1/2 degrees of a right angle to the axis of the bars and shall be fitted within 3 degrees of full bearing after assembly. Splice bars shall be held in concentric contact by a suitable device. The following are acceptable end bearing compression devices:
   1. Erico Products, Inc.; Speed Sleeve.
   2. BarSplice Products, Inc.; G-Loc
   3. Other Engineer-approved product.

B. Mechanical Tension Splices: Mechanical splices shall conform to Type 1 splices in accordance with ACI 318-05, ch. 21 as expressed in an ICC-Evaluation Service Evaluation Report. The bar ends that are to attach to the splice shall be prepared and installed in accordance with the manufacturer's requirements. Splices shall be approved by the ICC-Evaluation Service, Inc and shall have the Evaluation Report submitted for Engineer review. The following are

acceptable mechanical tension splices (splices qualified for use with grade 75 bars are parenthetically noted):

1. Dayton Superior; BarLock, S-Series.
2. Dayton/Richmond, Inc.; US/MC-SAE Mechanical Coupler.
3. Dayton/Richard, Inc.; DB Grout Sleeve.
4. BarSplice Products, Inc.; ZAP Screwlok (qualified for use with grade 75 bars).
5. BarSplice Products, Inc.; BPI Grip XL System.
6. BarSplice Products, Inc.; Taper Threaded Grip Twist System.
7. Erico Products, Inc.; Lenton Coupler (for grade 75 bars, use only Standard Coupler).
8. Splice Sleeve North America; NMB Splice Sleeve (qualified for grade 75, #7 bars and higher).
9. Dayton Superior; BarLock, L-Series.
10. Dayton Superior; Taperlok Couplers
11. Erico Products, Inc; Lenton Interlok.
12. Dextra Manufacturing Co, Griptec.
13. Other Engineer-approved product.

C. Splice Type and Lap Lengths: Required splice type and lap lengths are defined on the drawings. Lap splice lengths for unscheduled bars not shown otherwise on the drawings shall be 30 bar diameters minimum.

D. Dowel Bar Replacement: All grade 60 reinforcing steel dowel bars shown on the drawings crossing concrete construction joint surfaces with inserts cast flush against the form and having reinforcing bars connected to the insert in a subsequent concrete pour shall conform to the following:

1. Splice connection at insert shall develop the full tensile strength of the reinforcing steel conforming to a Type 2 splice in accordance with ACI 318-05, ch. 21.
2. Splices shall be approved by the ICC Evaluation Service, Inc. and shall have an Evaluation Report submitted for Engineer review.
3. The following are acceptable products (for use only with grade 60 bars):
   a. Erico Products, Inc.; Lenton Form Saver.
   b. Dayton/Richmond, Inc.; DB-SAE Dowel Bar Splicer.
   c. Other Engineer-approved product.

E. Hooked Anchorage Replacement: Reinforcing bar terminations shall be manufactured out of ASTM A 576 material and shall develop the full tensile strength of the bar when installed at the manufacturer's recommended depth.

1. The Anchorage shall be approved by the ICC Evaluation Service and shall have an Evaluation Report submitted for Engineer review.
2. The following are acceptable products (for use only with grade 60 bars):
   a. Erico Products, Inc.; Lenton Terminator.
   b. Other Engineer-approved product.

2.4 FORMWORK MATERIAL

A. Non-specific formed concrete: Unless otherwise specified, the default finish for formed surfaces shall be rough-form finish constructed with plywood, lumber, metal or other acceptable material. Lumber shall be dressed on at least two edges and one side for tight fit. The minimum grade shall be B-C, exterior grade.

B. Smooth-Formed Finish Concrete: Unless otherwise specified, formwork for exposed concrete surfaces as defined by the Form Finish Class noted on the drawings shall consist of plywood, metal, metal-framed plywood, or other acceptable surface. Formwork shall provide a continuous straight and smooth surface conforming to the joint system as specified on the Architect's drawings. Form material shall have sufficient thickness to withstand pressure of

concrete without bow or deflection. Plywood shall be exterior grade overlaid plywood complying with U.S. Product Standard PS-1, each piece showing a legible inspection trademark, and as follows:

1. High Density Overlay (100/30 min. rating) on Hardwood Face, Class 1or better.

C. Nails and Fasteners: Use only galvanized nails and fasteners for securing formwork in structures exposed to weather or unconditioned spaces such as garages, canopies and porte-cocheres.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to minimize spalling of concrete on removal.

E. Chamfer Strips: Provide wood, metal, PVC, or rubber strips, ¾ by ¾ inch, minimum.

F. Formwork Coatings: Formwork coatings shall be not a commercial formulation that will not bond with, stain, nor adversely affect concrete surfaces or impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede curing with water or curing compounds. Provide a product that has a maximum VOC (Volatile Organic Compounds) of 450 g/l but not greater than that permitted by the local government agency having jurisdiction in the area where the project is located.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Dayton Superior; Bio-Release EF.
   b. Unitex; Farm Fresh.
   c. The Euclid Chemical Company, Inc.; Form-Eze Natural.
   d. Universal Form Clamp; Bio-Form.
   e. US Spec; Aqua Blue.
   f. Conspec Marketing and Manufacturing Co., Inc.; Enviroform.
   g. Sonneborn Building Products; Cast-Off WB.
   h. Tamms Industries; Formshield WB.

2.5 RELATED MATERIALS

A. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide flat, dumbbell type or centerbulb type.

1. W.R. Grace & Co.; ADCOR ES
2. Polyvinyl chloride (PVC) waterstops: Corps of Engineers CRD-C 572.
3. Preformed Plastic Waterstops: Federal Specifications SS-S-210A "Sealing Compound for Expansion Joints".
   a. Manufacturers: Synko-Flex Products, Inc.

B. Vapor Retarder: Provide vapor retarder chosen from products specified below over prepared base material where indicated.

1. Plastic Vapor Retarder: Provide a flexible, preformed sheet membrane conforming to ASTM E 1745 with the following properties.
   a. Class A material
   b. Minimum of 15 mils thick
   c. Maximum water vapor permeance rating of 0.01 Perms after mandatory conditioning as tested by ASTM E 96
   d. Manufacturer's recommended tape and mastic
   e. Acceptable products include the following:
      1) Stego Industries, LLC; Stego Wrap Vapor Barrier (15 mil).
      2) Epro; Ecoshield-E (15 mil).
      3) Raven Industries; VAPORBLOCK 15 (15 mil).

2. Bituminous Vapor Retarders: Provide a pre-molded membrane consisting of reinforced core and carrier sheet with fortified bitumen layers, protective weather coating, and plastic anti-stick sheet conforming to ASTM E 1993 with the following properties:
   a. Maximum water vapor permeance rating of 0.002 Perms after mandatory conditioning as tested by ASTM E 96
   b. Manufacturer's recommended tape and mastic
   c. Acceptable products include the following:
      1) W.R. Meadows; Premoulded Membrane Vapor Seal with Plasmatic Core.
3. Tape for Plastic Moisture Retarders: High-density polyethylene tape with pressure sensitive adhesive having a minimum width of 4 inches.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171:
1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.
4. Polyethylene-coated natural cellulose fabric such as Greenstreak Group, Inc.; Aquacure.
5. Cover for Industrial Slab: Provide a low permeance moisture-retaining cover that allows a moisture loss of no more than 1 lb/sq. yd. in 72 h when tested in accordance with ATSM C 156 for industrial slabs. The material shall be non-staining with a tensile strength meeting ASTM D 882 and a minimum retention capacity of 6.5 g.

E. Slip-resistive Emery Aggregate or Aluminum Granule Finish: Provide fused aluminum-oxide granules, or crushed emery, as abrasive aggregate for slip-resistive finish. The emery aggregate shall contain not less than 50% aluminum oxide and not less than 20% ferric oxide. The aluminum aggregate material shall contain not less than 95% fused aluminum-oxide granules. Use material that is factory-graded, packaged, rust-proof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.
1. Subject to compliance with requirements, provide one of the following:
   a. Dayton-Superior; Emery Tuff Non-Slip.
   b. L&M Construction Chemicals, Inc.; Grip-It or Grip-It AO.
   c. Sonneborn-ChemRex; Frictex NS.

F. Liquid Membrane-Forming Curing and Curing and Sealing Compounds:
1. Water-Based Dissipating Resin Type Curing Compound: Curing Compound shall be a dissipating resin type, which chemically breaks down after approximately 4 weeks. Membrane forming compound shall meet ASTM C 309, Types 1 or 1D, Class B with a VOC content less than 350 g/L.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) The Euclid Chemical Company; Kurez DR Vox.
      2) L&M Construction Chemicals; L&M Cure R.
      3) Unitex; Hydro Cure 309.
      4) W.R. Meadows; Sealtight 1100-Clear.
      5) US Mix Co.; US Spec Maxcure Resin Clear.
      6) SpecChem; SpecRez.
   b. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with any covering or surface treatments to be applied. Submit any instructions that must be followed prior to any subsequent surface treatments and floor coverings.

G. Evaporation Control: Monomolecular film forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss in hot weather conditions.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. The Euclid Chemical Company; Eucobar.
      b. L&M Construction Chemicals; E-Con.
      c. BASF Building Systems; Confilm.
      d. Dayton-Superior; Sure Film (J-74).
      e. Sika Chemical Co.; SikaFilm.
      f. Unitex; Pro-Film.
      g. W.R. Meadows; Sealtight Evapre.
      h. US Mix Co.; US Spec Monofilm ER.
      i. SpecChem; SpecFilm RTU.
   2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all coverings and surface treatments to be applied. Submit any instructions that must be followed prior to any subsequent surface treatments.

H. Chemical Curing/Floor Hardener Compound: Sodium silicate based compound which reacts with concrete constituents to harden the surface, resulting in a surface having a maximum abrasion coefficient of 0.25 cm3/cm2 when tested in accordance with ASTM C 418.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. The Euclid Chemical Company; Eucosil.
      b. BASF Building Systems; Sonosil.
      c. Dayton-Superior; Day-Chem S.1-Cure (J-13).
      d. L&M Construction Chemicals; Chem Hard.
      e. Unitex; Uni Cure HD.
      f. W.R. Meadows; Med-Cure.
      g. US Mix Co.; US Spec Permasil.

   Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all coverings and surface treatments to be applied. Submit any instructions that must be followed prior to any subsequent surface treatments.

I. Bonding Compound: Polyvinyl acetate or acrylic base, for use in cosmetic and/or nonstructural repairs.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Acrylic or Styrene Butadiene:
         1) Dayton-Superior; Day-Chem Ad Bond (J-40).
         2) The Euclid Chemical Company; SBR Latex.
         3) W.R. Grace; Daraweld C.
         4) BASF Building Systems; Acrylic Additive.
         5) Sika Chemical Co.; SikaLatex.
         6) W.R. Meadows; Intralok.
         7) US Mix Co.; US Spec Acrylcoat.
         8) The Euclid Chemical Company; Akkro 7-T.
         9) SpecChem; Acrylic Bonder.
      b. Polyvinyl Acetate (Interior Use Only)
         1) The Euclid Chemical Company; Tammseld.
         2) L&M Construction Chemicals; Everweld.
         3) Dayton-Superior; Superior Concrete Bonder (J-41).
         4) US Mix Co.; US Spec Bondcoat.
         5) SpecChem; SpecWeld.

J. Epoxy Products: Two component material suitable for use on dry or damp surface, complying with ASTM C 881.

1. Products for Crack Repair:
   a. Sika Chemical Co.; Sikadur 35 Hi Mod LV – injection type.
   b. Sika Chemical Co.; Sikadur 52 – injection type.
   c. Sika Chemical Co.; Sikadur 55 SLV – gravity feed.
   d. The Euclid Chemical Company; Eucopoxy Injection Resin.
   e. Dayton-Superior; Sure-Inject (J-56).
   f. BASF Building Systems; Epofil SLV.
   g. Simpson Strong-Tie Co., Inc.; ETI-LV or ETI-GV – injection type.
   h. Unitex; Pro-Poxy 100 LV or Pro-Poxy 50-1.
   i. Adhesives Technology; Crackbond.
   j. W.R. Meadows; Rezi-Weld LV.
   k. US Mix Co.; US Spec Maxibond – injection or gravity feed.
   l. US Mix Co.; US Spec Eposeal LVS – gravity feed.
   m. The Euclid Chemical Company; Duralcrete LV.
   n. SpecChem; SpecPoxy 1000.
2. Products for Epoxy Mortar Patches:
   a. Sika Chemical Co.; Sikadur Lo-Mod LV.
   b. The Euclid Chemical Company; Duracrete.
   c. Dayton-Superior; Sure Level Epoxy (J-57).
   d. BASF Building Systems; Epofil.
   e. Unitex; Pro-Poxy 2500.
   f. W.R. Meadows; Rezi-Weld 1000.
   g. US Mix Co.; US Spec EPM 3000.
   h. The Euclid Chemical Company; Duralcrete LV.
   i. SpecChem; SpecPoxy Binder.
3. Products for Epoxying Steel Plates to Concrete: Conform to ASTM C 881-90, Type IV, Grade 3, Class A, B, & C except gel times.
   a. Sika Chemical Co.; Sikadur 31 Hi-Mod Gel.
   b. Dayton-Superior; Sure Anchor I (J-S1).
   c. BASF Building Systems; Epo Gel or Rapid Gel.
   d. Unitex; Pro-Poxy 300.
   e. US Mix Co.; US Spec Gelbond NS.
   f. The Euclid Chemical Company; Duralcrete Gel.
   g. SpecChem; SpecPoxy 3000.
4. Products for Adhesive Anchors or Reinforcing Steel in Normalweight Concrete: Product that conforms to ASTM C 881-02, Type IV, Grade 3, Class A, B, & C except gel times, and that is dispensed from a two-component cartridge system through a mixing nozzle that thoroughly mixes the two components as it is injected into the hole.
   a. ICC Approval: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published, currently valid, Evaluation Report showing it as having passed Acceptance Criteria 308 shall be approved for use.
   b. Consult with the manufacturer for the minimum temperature of the concrete substrate allowed.
   c. All anchors installed upwardly inclined require continuous inspection unless an exception to the continuous special inspection for upwardly inclined installation is noted on the drawings.
   d. Normal weight Concrete:
      1) Hilti Fastening Systems; HIT-RE 500-SD (periodic inspection unless anchors are installed upwardly inclined)
      2) Simpson Strong-Tie; SET-XP Adhesivee (periodic inspection unless higher factors are used in design requiring continuous inspection as noted on the drawings or anchors are installed upwardly inclined)
      3) Powers Fasteners, Inc.; PE 1000+ (periodic inspection unless anchors are installed upwardly inclined)

4) Hilti Fastening Systems; HIT-HY 150 MAX-SD (periodic inspection unless anchors are installed upwardly inclined)

e. Lightweight Concrete:
1) No approved products

f. These products may not be used in concrete cast over corrugated deck.

g. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state where the project is located and furnished to the Engineer for review and approval prior to commencement of work. The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

K. Self-Leveling Mortars, Underlayment Compound: Freeflowing, self-leveling, pumpable cementitious base compound. Follow manufacturer's instruction regarding the use of a bonding agent.
1. Products: Unless specified otherwise, provide one of the following:
a. BASF Building Systems; Sonoflow.
b. Sika Chemical Co.; Sikatop 111.
c. The Euclid Chemical Company; Flo-Top or Super Flo-Top.
d. Dayton-Superior; Levelayer I.
e. US Mix Co.; US Spec Self-Leveling Underlayment.
f. The Euclid Chemical Company; Level Magic.
g. SpecChem; SpecFlow.

L. Polymer Patching Mortar: Polymer and microsilica modified cementitious based compounds.
1. Products:
a. Horizontal Application
1) The Euclid Chemical Company; Thin Top Supreme, Concrete Top Supreme.
2) Sika Chemical Co.; Sikatop 121 or 122.
3) BASF Building Systems; Emaco R310 CI.
4) BASF Building Systems; Sonopatch 100 or 200.
5) US Mix Co.; US Spec H2 or NuTop.
6) The Euclid Chemical Company; Speed Crete PM.
7) SpecChem; RepCon H.
b. Upwardly Inclined Application
1) The Euclid Chemical Company; Verticoat/Verticoat Supreme.
2) Sika Chemical Co.; Sikatop 123.
3) BASF Building Systems; Emaco R350 CI.
4) BASF Building Systems; Sonopatch 200.
5) US Mix Co.; US Spec V/O Patch.
6) The Euclid Chemical Company; Speed Crete PM.
7) SpecChem; RepCon V/O.

M. High Strength Flowing Repair Mortar: For forming and pouring structural members, or large horizontal repairs, provide flowable one-part, high strength microsilica polymer modified repair mortar with 3/8" aggregate. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.
1. Products:
a. BASF Building Systems; Road Patch.

b. US Mix Co.; US Spec STR Mortar.
c. The Euclid Chemical Company; Eucocrete.
d. The Euclid Chemical Company; Form and Pour.
e. SpecChem; RepCon 928.

N. Anti-Corrosive Epoxy/Cementitious Adhesive: Water-based epoxy/cementitious compound for adhesion and corrosion protection or reinforcing members (20 hour maximum open time).
1. Products:
a. The Euclid Chemical Company; Duralprep A.C.
b. Sika Chemical Co.; Armatec 110.
c. BASF Building Systems; Sonoprep Plus.

O. Expansion Anchors in Concrete:
1. ICC Approval: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published Evaluation Report showing having passed Acceptance Criteria 193 and approval for use in cracked concrete and resisting wind and seismic loads shall be approved for use.
2. Type: All expansion anchors in concrete shall be only wedge type expansion, sleeve type expansion or undercut type bolts.
3. Interior Use: All expansion anchors, nuts and washers for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.
4. Exterior or Exposed Use: All expansion anchors, nuts and washers for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized bolts, nuts and washers shall conform to ASTM A 153. Stainless steel bolts shall be manufactured from 300 series stainless steel and nuts and washers from 300 series or Type 18-8 stainless steel.
5. Nuts and Washers: Nuts and washers shall be furnished from the manufacturer and used with the bolts.
6. Acceptable Products and Manufacturers – Normal and Lightweight Concrete:
a. Hilti Fastening Systems; Kwik Bolt TZ (periodic inspection)
b. Hilti Fastening Systems; HDA Undercut Anchor (periodic inspection)
c. Hilti Fastening Systems; HSL-3 Heavy Duty Sleeve Anchor (periodic inspection)
d. Simpson Strong-Tie Co., Inc.; Strong-Bolt Wedge Anchor (periodic inspection)
e. Simpson Strong-Tie Co., Inc.; Strong-Bolt 2 Wedge Anchor (periodic inspection)
f. ITW Red Head; Red Head Trubolt + Wedge Anchor (periodic inspection)
g. USP Structural Connectors; DUC Undercut Anchor (periodic inspection)
h. Powers Fasteners, Inc.; Power Stud + SD1 Expansion Anchor (periodic inspection)
i. Powers Fasteners, Inc.; Power Stud + SD2 Anchor (periodic inspection)
j. MKT Metall-Kunststoff-Technik/UCan Fastening Products; SRS TZ Anchor, (periodic inspection)
7. Acceptable Products and Manufacturers – Normal and Light Weight Concrete on Corrugated Deck:
a. Hilti Fastening Systems; Kwik Bolt TZ (periodic inspection)
b. Simpson Strong-Tie Co., Inc.; Strong-Bolt Wedge-Anchor (periodic inspection)
c. Powers Fasteners, Inc.; Power Stud + SD2 Anchor (periodic inspection)
8. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state

where the project is located and furnished to the Engineer for review and approval prior to commencement of work. The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

P. Screw and Insert Anchors in Concrete

1. Approvals: Only anchors evaluated by the ICC Evaluation Service, Inc. (ICC-ES) with a published Evaluation Report showing having passed Acceptance Criteria 193 and approved for use in cracked concrete and resisting wind and seismic loads shall be approved for use.
2. Interior Use: All screw anchors for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.
3. Exterior or Exposed Use: All screw anchors for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized anchors shall conform to ASTM A 153. Stainless steel anchors shall be manufactured from 300 series stainless steel.
4. Acceptable Products and Manufacturers – All Conditions:
   a. Simpson Strong-Tie Co., Inc.; Titen HD (periodic inspection)
   b. Powers Fasteners, Inc.; Snake+ Anchor (periodic inspection)
   c. Powers Fasteners, Inc.; Wedge-Bolt+ (greater than ¼ in. diameter) (periodic inspection)
5. Install only anchors identified on the drawings by manufacturer and product. Substitutions using products approved by this Specification may be permitted provided complete design calculations, as required by and in accordance with the proposed product's current and valid ICC Evaluation Service Report (ESR) and ACI 318 Appendix D, are signed and sealed by a professional engineer licensed in the state where the project is located and furnished to the Engineer for review and approval prior to commencement of work. The contractor shall request design criteria for all conditions where a product substitution is considered. Failure to obtain approval for an anchor substitution may result in the request by the Engineer to remove installed anchors and replace with the product specified on the drawings at the Contractor's expense.

Q. Threaded Rods Chemically Anchored in Concrete

1. Type; Threaded rods installed in holes using a chemical anchoring process shall have a 45º chiseled end on one end.
2. Interior Application; Meet the requirements of ASTM A 307, A 36 or A 193, grade B7 (as allowed by the applicable ESR report).
3. Exterior Application: Meet the requirements of ASTM A 153 galvanized steel, or F 593, Group 1 or 2, condition CW stainless steel (as allowed by the applicable ESR report).

R. Anchor Rods:

1. All anchor rods shall conform to ASTM F 1554 unless noted otherwise on the drawings and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:
   a. ASTM F 1554, Grade 36 (1/4 inch to 4 inches in diameter).
2. Anchor rods used with ASTM A 588 baseplates shall be threaded round stock conforming to ASTM A 588, grade 50.
3. Anchor rods used with galvanized baseplates shall be galvanized.
4. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.

5. Washers: Unless noted otherwise on the drawings, washer size and thickness for all anchor rods shall conform to Table 14-2 of AISC "Steel Construction Manual" with holes 1/16" greater than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.

S. Reglets: Where resilient or elastomeric sheet flashing or bituminous membrane is terminated in reglets, provide reglets of not less than 26 gage galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

T. Carton Forms: Carton forms shall be manufactured using corrugated paper material with a moisture resistant exterior surface and specifically designed for foundation support. Carton forms shall be designed to support the wet weight of the concrete that is shown by the details to be poured on top of the form but not less than 600 psf. Refer to the Reinforced Concrete General Notes for the restriction on horizontal construction joints. The forms shall be designed in such a way that the bottom of the form will collapse when acted upon by upward movement of the soil.

1. Form Configuration: Carton forms shall be of a vertical cellular configuration only, except as permitted by item 5 below, and shall be rectangular as shown on the details. The depth of the carton forms is shown on the details. Forms shall be manufactured to fit snugly against round piers and shall be baffled in such a way as to prevent concrete from flowing back into the form during the concrete pour. The Contractor shall use expandable foam to fill all gaps and holes between carton forms and at intersections with foundations.
2. Carton forms shall be kept dry and protected until concrete is poured. Wet, compressed, or deteriorated carton forms shall not be used. Do not wrap or cover carton forms with polyethylene sheets or permanent waterproof cover as that will prevent proper deterioration of the forms.
3. Technical data and brochures on carton forms shall be submitted for Engineer's review.
4. Other types of forms using different types of paper and different configurations will be accepted if it can be shown by independent tests that the form will properly function and will deteriorate due to moisture in an appropriate time frame.
5. For slab conditions, cover carton forms with a 1/4 inch masonite protection cover board to prevent puncture and other damage during construction.
6. Products: Subject to requirements, acceptable manufacturers include but are not limited to the following:
   a. SureVoid Products, Inc.

U. Precast Concrete Retainers

1. Retainers shall be used with voids or carton forms where shown on the drawings.
2. Retainers shall have a minimum compressive strength of 2500 psi, reinforced with 6x6xW1.4xW1.4 weld wire fabric, and minimum thickness of 1 5/8".

V. Contraction and Construction Joint-Filler Material for Slabs-on-Grade: Provide a 2-component semi-rigid, 100% solids epoxy having a minimum shore A hardness of 75 when tested in accordance with ASTM D 2240. Subject to compliance with requirements, provide one of the following:

1. The Euclid Chemical Company; Euco 700.
2. Conspec Marketing and Manufacturing Co.; Inc.; Spec-Joint CJ.
3. BASF Building Systems; Masterfill 300 I.
4. Metzger/McGuire Co.; MM-80.
5. W.R. Meadows; Rezi-Weld Flex.
6. US Mix Co.; US Spec SR-50 EJF.
7. SpecChem; SpecPoxy CJ.

W. Joint-Filler Strips for Isolation Joints in Slabs-on-Grade: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork

X. Bondbreaker for Construction Joints in Slabs-on-Grade: A dissipating bondbreaking compound containing no silicones, resins, or waxes, and that conforms to ASTM C 309. Subject to compliance with requirements, acceptable manufacturers include the following:
1. Dayton-Superior Corporation, Inc.; Sure-Lift.
2. Conspec Marketing and Manufacturing Co.; Tilt-Eez.
3. SpecChem; SpecTilt 100.

Y. Rigid-Celllular-Polystyrene Boards use as Fill under Topping Slabs or Slabs-on-Grade: Provide rigid, expanded (EPS) or extruded (XPS) cellular polystyrene boards that conform to ASTM D 6817 or ASTM C 578 with a minimum density of [Polystyrene Density] kg/m3. Subject to compliance with requirements, acceptable manufacturers include the following:
1. Dow Chemical Company; STYROFOAM Brand.
2. R-Control Buiding Systems; R-Control EPS Geofoam - All grades.
3. Carpenter Co.; EPS Geofoam
4. Knauf Polystyrene; Knauf Geofoam.
5. Premier Industries; Insulfill.

2.6 PROPORTIONING AND DESIGN OF CONCRETE MIXES

A. The Contractor shall submit concrete mix designs and the Concrete Mix Design Submittal Form located at the end of this specification section for each class of concrete indicated on the structural drawings and in the Specifications for approval by the Engineer and Owner's Testing Laboratory at least 15 working days prior to the start of construction,. If required, the Contractor shall engage the services of an independent Testing Laboratory to assist in preparing the mix design. The Contractor shall not begin work with a particular mix until that mix design has been approved.

B. The Contractor, acting in conjunction with his Concrete Supplier and his Testing Laboratory, shall submit in writing, with his mix designs, the method used to select mix proportions. Either of the following methods, as outlined in ACI 301, may be used.
1. Field Experience Method
2. Laboratory Trial Mixture Method

C. Required types of concrete and compressive strengths shall be as indicated on the Structural Drawings.

D. All mix designs shall state the following information:
1. Mix design number or code designation by which the Contractor shall order the concrete from the Supplier.
2. Structural slab or member for which the concrete is designed (i.e. columns, shear walls, footings, slab on grade, etc.).
3. Wet and dry unit weight.
4. 28 day compressive strength.
5. Aggregate type, source, size, gradation, fineness modulus.
6. Cement type and brand.
7. Fly ash or other pozzolan type and brand (if any).
8. Admixtures including air entrainment, water reducers, high-range water reducers, accelerators, and retarders.
9. Design Slump or Slump/Flow.
10. Proportions of each material used.
11. Water/cementitious ratio and maximum allowable water content.
12. Method by which the concrete is intended to be placed (bucket, chute, or pump).

13. Required average strength qualification calculations per ACI 301 4.2.3.3a and 4.2.3.3b. Submit separate qualification calculations for each production facility that will supply concrete to the project.
14. Documentation of Average strength (trial mix data or field test data) per ACI 301: When field test data is used to qualify average strength, submit separate documentation for each production facility that will supply concrete to the project.
15. Field test data submitted for qualification of average strength under ACI 301 shall include copies of the Concrete Testing Agency's reports from which the data was compiled.
16. All other information requested in the Concrete Mix Design Submittal Form located at the end of this specification section.

E. Supplementary Cementitious Materials: Fly ash and/or ground granulated blast-furnace slag replacement of Portland cement shall meet the performance criteria and replacement percentage requirements listed below unless noted otherwise. Every effort should be made to reduce the amount of cement to the minimum practical amount, and still achieve the performance requirements contained in the Contract Documents.
1. Cement replacement shall not exceed a percentage level that has been shown by experience on other projects to exhibit satisfactory performance using materials from identical sources as proposed for this project. As an alternate, trial concrete batches can be performed to identify mix designs that maximize cement replacement while meeting strength requirements per ACI 318 Section 5.3 and workability criteria.
2. Minimum and maximum replacement percentages:
    a. Foundations (including piers, pier caps, footings and grade beams): 40% - 60%
    b. Columns, Walls, Elevated Structure, Slab-on-Grade: 25% - 35%
    c. All Other Concrete: 0% - 35% (If fly ash is used, it must be at a minimum replacement percentage of 15%)
    3. Replacement percentages exceeding the maximum may be permitted at the discretion of the Architect, Engineer of Record, and Contractor.
    4. For concrete identified on the drawings as being subject to Exposure Class F3, the maximum amount of supplementary cementitious materials shall not exceed the limits noted in table 4.4.2 of ACI 318-08

F. Aggregate: Comply with the following special requirements:
1. For exposed concrete, provide aggregates from a single source.

G. Admixtures:
1. Admixtures to be used in concrete shall be subject to the approval of the Engineer and Owner's Testing Laboratory and shall be used for the purpose intended by the manufacturer to produce concrete to meet the specified requirements.
2. Quantities of admixtures to be used shall be in strict accordance with the manufacturer's instructions.
3. Air Content Requirements: For concrete subject to Exposure Class F1, F2 or F3 as noted on the drawings, use air-entrainment admixtures to provide concrete such that the air content at the point of delivery shall conform to the requirements of Table 4.4.1.of ACI 318-08 within plus or minus 1.5%. Required air content levels may be reduced by 1.0 percent for concrete strengths above 5000 psi. Interior steel troweled surfaces subjected to vehicular traffic shall not have more than 3% entrained air. Surfaces scheduled to receive hardeners shall not have more than 3% entrained air.

H. Lightweight Structural Concrete:
1. Comply with the requirements of ACI 211 and ACI 301.

2. Provide concrete with a dry unit weight of not more than 116 pounds per cubic foot and not less than 110 pounds per cubic foot. Design mix to produce strengths as indicated on the drawings with a split cylinder strength factor (fct/(f'c)0.5) of not less than 5.7.

I. Adjustments of Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Such mix design adjustments shall be provided at no additional cost to the Owner. Any adjustments in approved mix designs including changes in admixtures shall be submitted in writing with the specified Concrete Mix Design Submittal Form to the Engineer and Owner's Testing Laboratory for approval prior to field use.

J. Chloride Ion Content:

1. Unless noted otherwise, The maximum water soluble chloride ion concentration in hardened concrete measured at ages from 28 to 42 days contributed from all ingredients including water, aggregates, cementitious materials, and admixtures shall not exceed the limits specified in ACI 318-08 Table 4.3.1 depending on to which Corrosion Exposure Class (CO, C1 or C2) the concrete is subject as noted on the drawings. Water-soluble chloride ion tests shall conform to ASTM C 1218. One test shall be run for each class of concrete before the mix design submittal and each time a change is made to the mix design (such as change in aggregate type or source).
2. The chloride ion content in all concrete used for prestressed or post-tensioned concrete shall not exceed .06 percent by weight of cement.
3. The Concrete Supplier shall certify on the Mix Design Submittal Form that the chloride ion content in all concrete mix designs used on the project does not exceed the limits stated above.

2.7 CONCRETE MIXING

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94.

PART 3 - EXECUTION

3.1 FABRICATION AND CONSTRUCTION OF FORMWORK

A. Design, erect, support, brace and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic construction loads that might be applied until the concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 117.

C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

F. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and patch forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

G. Chamfer exposed corners and edges as indicated, using specified chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

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

3.2 CLEANING AND TIGHTENING

A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and all other debris just prior to concrete placement. Retighten forms and bracing prior to concrete placement as required to prevent mortar leaks and maintain proper alignment.

3.3 CLEANING AND RE-USE OF FORMS

A. Forms reused in the work shall be repaired and cleaned. Split, frayed, delaminated, or otherwise damaged facing material will not be acceptable for exposed surfaces. Forms intended for successive concrete placement shall have surfaces cleaned, fins and laitance removed, and joints tightened to avoid surface offsets. New form coating compound shall be applied to reused forms. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.4 TOLERANCES

A. Unless specified otherwise, all tolerances for concrete formwork shall conform to ACI Standard 117, "Standard Tolerances for Concrete Construction and Materials". Before concrete placement the Contractor shall check lines and levels of erected formwork and make any corrections and adjustments as required to ensure proper size and location of concrete members and stability of forming systems. During concrete placement the Contractor shall check formwork and supports to ensure that forms have not displaced and that completed work will be within specified tolerances.

B. Construct forms so as to limit the offset between adjacent pieces of formwork facing material in accordance with the surface tolerance class as defined in ACI 117 corresponding to the surface finish class noted on the drawings. The offset limits shall apply to both abrupt and gradual variations in the surface.

3.5 REMOVAL OF FORMS AND SUPPORTS

A. Records of Weather Conditions: The General Contractor shall be responsible for keeping records of weather conditions to be used in the decision on when to remove forms.

B. Formwork Not Supporting Concrete: Formwork not supporting concrete such as sides of walls and similar parts of the structure, may be removed after cumulatively (not necessarily consecutively) curing at not less than 50°F for 12 hours after placing concrete, provided the

concrete is sufficiently hard so as not to be damaged by form removal operations and provided curing and protection operations are maintained. If ambient air temperatures remain below 50°F, if retarding agents are used, or if Type II and Type V Portland cement is used, then this specified minimum period should be increased as required to safely remove the forms without damage to the concrete. Where such forms also support formwork for slab or beam soffits, the removal times of the latter shall govern.

3.6 FABRICATION AND DELIVERY OF REINFORCEMENT

A. Bending and Forming: Fabricate bars of indicated sizes and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do not heat reinforcement for bending. Bars shall be free from injurious defects, have a workman-like finish with no excessive rust and/or pitting and have no unusual kinks or bends.

B. Marking and Shipping: Bundle reinforcement and tag in accordance with section 7.4.5 of the CRSI "Manual of Standard Practice". Transport and store at site so as not to damage material. Keep sufficient supply of tested, approved and proper reinforcement at the site to avoid delays. Maintain reinforcing bars free of mud, dirt, grease, or other coating.

3.7 PLACING REINFORCEMENT

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

B. Before placing and again before concrete is placed, clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by chairs, runners, bolsters, spacers and hangers, as required. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide metal spreaders and spacers to hold steel in position. Support steel at proper height upon approved chairs.

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

E. Include for projects containing spread footing foundations.

F. Support of Spread Footing Reinforcing Steel
   1. Bottom Steel: Support bottom reinforcing mat to provide the specified clearance to the bars. Spacing between supports shall not exceed 4'-0" centers each way.
   2. Top Steel: Support top reinforcing on steel angle frames braced in both directions or on special standee support bars. Spacing between supports shall not exceed 4'-0" centers each way. The depth of the supports shall provide the specified clearance from the bars to the top of the concrete. The design of the support steel shall be the responsibility of the Contractor.

G. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus two inches and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

H. Coordinate with other trades and expedite materials and labor to avoid omissions and delay.

I. Install waterproof membrane or vapor barrier as specified prior to placing steel for concrete slabs-on-grade.

J. Extend reinforcement continuous through construction joints unless otherwise shown on the drawings or, if approved on the shop drawings, provide dowels of sufficient length to develop the full tension or compression strength of the bar as applicable.

K. Slab-on-Grade Joint Dowel Bars: Support slab-on-grade joint dowel bars independently of support for slab reinforcement on soil supported slab bolsters or specially manufactured cradles such that dowel bar remains parallel to slab surface and at right angles to joint during concreting operations. Lightly coat the exposed end of the dowel with a paraffin-base lubricant, asphalt emulsion, form oil, or grease or use a dowel bar sleeve specifically manufactured for the purpose of preventing a bond between the dowel and the concrete.

L. Alternate Slab-on-Grade Joint Load Transfer Systems: Install the load transfer system in accordance with the manufacturer's direction such that the horizontal plane of the flat plate is parallel to the plane of the subgrade on which the slab is bearing.

M. Provide and place additional reinforcing steel at all sleeves and openings in beams, slabs and walls as specified on the drawings. Where sleeves or openings not shown on the drawings interrupt the reinforcement, consult with Engineer for instructions for placing and splicing of bars. Provide required additional reinforcing steel at no additional cost to the Owner.

3.8 REINFORCING STEEL

A. Provide splice as indicated on the drawings. Splice reinforcing bars only at locations shown on the structural drawings and approved shop drawings. Unauthorized or unscheduled splices not approved by the Engineer in writing will not be accepted.

B. All lap splices in reinforcing steel shall be contact lap splices unless detailed otherwise on the drawings.

C. Maintain proper cover between reinforcing bars at splices.

D. Lap unscheduled reinforcing bars not otherwise specified a minimum of 30 bar diameters at splices. Lap welded wire fabric a minimum of one full wire mesh plus two inches.

E. Manufacturer of mechanical tension splice should be present for first day's installation.

3.9 WELDING REINFORCING STEEL

A. Welding reinforcing steel is permitted only where specifically shown on the drawings. All welding shall conform to AWS D1.4 "Structural Welding Code - Reinforcing Steel". Only weldable reinforcing steel conforming to ASTM A 706 or deformed bar anchors conforming to ASTM A 496 shall be permitted. ASTM A 615 bars may not be welded for structural use.

B. Tack welding of reinforcement shall only be allowed for preassemble mats and cages.

3.10 SLUMP LIMIT

A. The slump, as measured in the field where concrete cylinders are taken, shall be within plus or minus 1 inch of the design slump noted on the Mix Design Submittal Form. Self-consolidating concrete shall have a slump/flow of plus or minus 2 inches of the design slump noted on the Mix Design Submittal Form. Water may be added to the concrete in the field only to the extent that the prescribed water/cementitious ratio noted in the Mix Design Submittal Form is not exceeded.

3.11 VAPOR RETARDER INSTALLATION

A. Install and repair damages vapor retarder in accordance with ASTM E 1643 and manufacturer's instructions.

B. Lap all seams per manufacturer's instruction (6" minimum lap) and seal all joints in the field with the specified pressure sensitive tape. Heat-welded joints done in a shop prior to delivery is an acceptable method to minimize the number of field joints.

C. Seal all pipe penetrations through the vapor retarder with a boot made from the moisture retarder material and tape or mastic.

3.12 JOINTS IN CONCRETE

A. Construction Joints: Locate and install construction joints as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Architect/Engineer.

1. Keyways: Provide keyways with a depth of one tenth of the member thickness (1 1/2" minimum or as shown on the drawings) in construction joints only where shown on the drawings.
2. Joint Construction: Place construction joints in the center one third of grade beams and as shown on the drawings for slabs-on-grade and walls unless shown otherwise. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise shown on the drawings. Dowels that cross construction joints shall be supported during concreting operations so as to remain parallel with the slab or wall surface and at right angles to the joint. Submit all construction joint locations as a shop drawing submittal.
3. Waterstops: Provide waterstops in construction joints as indicated on the Architectural and Structural Drawings. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
4. Isolation Joints in Slabs-on-Ground: Construct isolation joints (without dowels) in slabs-on-ground at points of contact between slabs on ground and vertical surfaces only where specifically detailed on the drawings. Install joint-filler strips at joints where indicated. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated on the drawings. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together. Provide construction joints with dowels at all locations unless isolation joints are detailed.
5. Contraction (Control) Joints in Slabs-on-Ground: Maximum joint spacing shall be 36 times the slab thickness or 20 feet, whichever is less and at a minimum on column lines unless otherwise noted on the drawings. Use one of the two following methods (sawed or formed) to create the joints. Do not use the formed joint in areas subject to vehicular traffic.
    a. Sawed Joints
        1) Primary Method: Early-Entry, dry-cut method, using Soff-Cut saws. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 1 to 4 hours, depending on air temperature, after final finish as soon as the concrete surface is firm enough to not be torn or damaged by the blade at each saw cut location. Use 1/8 inch thick blade, cutting to a depth of ¼ of slab thickness but not less than 1 inch. Cut to a depth of 1/3 slab thickness for slabs reinforced with steel fibers or synthetic fibers.

2) Optional Method (where Soff-Cut System method equipment is not available, subject to limitations): This method may not be used when there is no dowel passing through the contraction joint. Use a conventional saw to cut joints within 4 to 12 hours after finishing as soon as the concrete has hardened sufficiently to prevent aggregates from being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/8 inch thick blade, cutting to a depth of 1/4 of the slab thickness but not less than 1 inch. Cut to a depth of 1/3 slab thickness for slabs reinforced with steel fibers.

b. Formed Joints: Form contraction joints by inserting premolded plastic hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. The depth is to be 1/4 the slab thickness, but not less than 1 inch. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

c. Joint Filler: Provide in both contraction and saw-cut construction joints when specified.

1) Remove dirt and debris from the joint by vacuuming immediately prior to filling joint. Clean the joint of curing compounds and sealers.

2) Filler material shall be applied to the joints when the building is under permanent temperature control, but no less than 90 days after slab construction.

3) Follow the manufacturer's recommended procedure for installing filler material. The joint filler must be flush with the adjacent concrete. A concave profile on the top of the joint filler is unacceptable and will be grounds for removal and replacement.

d. The Contractor shall protect the joints from damage caused by wheeled traffic or other sources during construction until a joint-filler material (if specified) has been installed.

3.13 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto unless directed otherwise by these specifications. Install reglets to receive top edge of foundation sheet waterproofing where specified by the Architect, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles and other conditions.

B. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work as shown on the drawings. Furnish 1/8" minimum steel templates for presetting rods and other anchors to accurate locations as shown on the drawings in keeping with the tolerances noted in ACI 117 for embedded anchor rods..

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

D. Do not install sleeves in concrete slabs, pier caps, footings or walls except where shown on the structural drawings or approved by the Architect and Engineer.

E. Securely fasten embedded plates, angles, anchor rods and other items to be built into the concrete to the formwork or hold in place with templates. Insertion of these items into concrete after casting is prohibited.

3.14 CONCRETE PLACEMENT

A. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

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

C. Comply with ACI 301 and as herein specified.

1. The maximum acceptable concrete temperature at the truck discharge point shall be 95°F.
2. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation. Spread concrete using short-handled, square-ended shovels, or come-alongs.
3. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
4. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use internal vibrators of the largest size and power that can properly be used in the work as described in the table entitled "Range of characteristics, performance, and applications of internal vibrators" found in ACI 301.
5. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
6. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
7. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners of forms, eliminating air and stone pockets that may cause honeycombing, pitting, or planes of weakness.
8. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface free of humps or hollows before excess moisture or bleedwater appears on the surface. Do not disturb slab surfaces prior to beginning finishing operations.
9. Maintain reinforcing in proper position during concrete placement operations.
10. Placing Concrete by Pump: If concrete is placed by using a pump, the grout used for pump priming must not become a part of the completed structure unless an engineered grout design mix and grout location are approved in advance by the Engineer.

3.15 FINISH OF FORMED SURFACES

A. General: Formed surfaces shall have the finishes as described below and as shown on the drawings after formwork is removed and repairs made.

B. Matching Sample Finish: Finish on surfaces at locations noted on drawings shall match sample panel furnished to Contractor. Reproduce finish on a 100 square foot mock-up panel in a location designated by Architect/Engineer. Protect mock-up from damage for the duration of project. Approval of mock-up by Architect is required before proceeding with application of finish in project.

C. Definitions and Finish Requirements
   1. Surface Finish 1.0 (SF-1.0):
      a. No formwork facing material is specified
      b. Patch voids larger than 1-1/2 in. wide or 1/2 in. deep
      c. Remove projections larger than 1.0 inch.
      d. Provide surface tolerance Class D as specified in ACI 117
      e. Tie holes need not be patched
   2. Surface Finish 1.1 (SF-1.1)
      a. No formwork facing material is specified
      b. Patch voids larger than 1 in. wide or 1/2 in. deep
      c. Remove projections larger than 1/2 inch.
      d. Provide surface tolerance Class C as specified in ACI 117
      e. Tie holes need not be patched
   3. Surface Finish 2.0 (SF-2.0):
      a. Provide specified formwork-facing material
      b. Patch voids larger than 3/4 in. wide or 1/2 in. deep
      c. Patch tie holes
      d. Remove projections larger than 1/4 in.
      e. Provide surface tolerance Class B as specified in ACI 117
      f. Provide mock-up of concrete surface appearance.

D. Standard Finish: Provide SF-1.0 on all concrete surfaces unless otherwise specified.

E. Exposed Finishes: Unless otherwise specified provide SF-2.0 on all concrete surfaces exposed to view in final condition.

F. Related Unformed Surfaces: At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.16 MONOLITHIC SLAB FINISHES

A. Place, consolidate, strike off, and level concrete, eliminating high spots and low spots, before proceeding with any other finish operation. Do not add water to the surface of the concrete during finishing operation.

B. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo and other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerance specified below. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

C. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or

elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using a hand float, a bladed power float equipped with float shoes, or a powered disk float, when the bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit the operation. Check and level surface plane to a tolerance as specified below. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

D. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin film finish coating system. After floating, begin first trowel finish operation by hand or power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a level surface to a tolerance as specified below. Grind smooth surface defects which would telegraph through applied floor covering system.

E. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply initial trowel finish as specified above, then immediately follow with slightly scarifying surface by fine brooming.

F. Slip-Resistive Broom Finish: Apply slip-resistive broom finish to ramps less than 6% slope, exterior concrete platforms, steps and ramps and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Roller-Bug Finish: Provide a roller-bug finish with a minimum ¼" amplitude to all ramps exceeding a 6% slope. Extend the finish as least 12 feet beyond the beginning and ending of the greater-than-6% ramp. The finish shall be imprinted on the concrete by the use of a roller-bug tamper.

H. Chemical-Hardener Finish: Apply chemical-hardener finish to interior concrete floors where indicated. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Apply proprietary chemical hardeners, in strict accordance with manufacturer's printed instructions. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

I. Slip-Resistive Aggregate Finish: Apply slip-resistive aggregate finish to concrete stair treads, platforms, ramps and elsewhere as indicated on the Architect's or Structural Drawings.
   1. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened slip-resistive aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
   2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose slip-resistive aggregate.

J. Finish of Top of Spread Footings:
   1. Top Surface below Finished Slab: The top of the footing or mat shall be screeded level and smooth with a flatness F-number, F_F15 (overall), F_F10 (minimum local) and a levelness F-number, F_L12 (overall), F_L10 (minimum local).
   2. Top Surface as Finished Slab: The top surface of a footing or mat that is to serve as the finished slab in the building shall be leveled, cured, and surface prepared as

specified for the finished floor construction appropriate to the space usage as defined in the Architectural Drawings.

3.17 CONCRETE FINISH MEASUREMENT AND TOLERANCES

A. Testing Procedure: ASTM E 1155:

B. Tolerance on Floor Elevations: Construction tolerance on absolute floor elevation from the specified elevation as shown on the drawings shall be as specified below, taken from ACI 117:
1. Slab-on-Grade Construction: ±3/4".
2. Top surfaces of all other slabs: ±3/4".

C. The tolerance on relative elevation difference between points on the floor shall be defined by the FL Levelness F-Number as prescribed below.

D. Random Traffic Floor Finish Tolerances:
1. Specified overall values for flatness (SOFF) and levelness (SOFL) shall conform to the values listed below for the floor surface classification noted for each slab category noted.
   a. Conventional:
      1) SOF_F: 20.
      2) SOF_L: 15.
   b. Moderately Flat:
      1) SOF_F: 25.
      2) SOF_L: 20.
   c. Flat:
      1) SOF_F: 35.
      2) SOF_L: 25.
   d. Very Flat:
      1) SOF_F: 45.
      2) SOF_L: 35.
   e. Super Flat:
      1) SOF_F: 60.
      2) SOF_L: 40.
2. Minimum local values for flatness (MLFF) and levelness (MLFL) shall equal 3/5 of the SOFF and SOFL values, respectively, unless noted otherwise. The MLFF and MLFL values shall apply to the minimum areas bounded by the column lines and half-column lines, or the minimum areas bounded by the construction and contraction joints, whichever are the smaller areas.
3. The SOFL and MFLL tolerance values shall apply only to level slabs-on-ground. The Levelness tolerance numbers shall not apply to unshored slabs that deflect under self-weight.
4. Slabs specified to slope shall have a tolerance from the specified slope of 3/8" in 10 feet at any point.

E. Construction Requirements to Achieve Specified Floor Finish Tolerances:
1. Forms shall be properly leveled, in good condition and securely anchored including special attention to ends and transitions.
2. Bearing surfaces for straightedges such as form edges or previously poured slabs shall be kept clean of laitance, sand, gravel, or other foreign elements.
3. Screeds shall be maintained in good condition with true round rolling wheels and level cutting edges. The use of optical sighting equipment such as lasers is recommended for checking levelness and straightness. The Contractor shall promptly adjust or replace equipment when test results indicate substandard work.

4. Highway straightedges are recommended for use in lieu of bullfloats for all slab placement and finishing operations.

F. Contractor Responsibility for Concrete Floor Finish Requirements: Floor finish requirements shown below (flatness and levelness tolerances) are minimum requirements that apply unless stricter requirements are contained in instructions for installation of applied floor products in which case the Contractor is responsible for attaining the values prescribed by the manufacturer of such products.

G. Concrete Floor Finish Tolerance for Slab-on-Grade Construction:
1. Concrete Placement: Concrete shall be placed and screeded to predetermined marks set to elevations prescribed on the drawings.
2. Finish Tolerances of Random Traffic Floor Surfaces:
   a. Slabs in nonpublic areas, mechanical rooms, surfaces to received raised computer flooring, surfaces to have thick-set tile or a topping, and parking structures: Conventional
   b. Carpeted Areas: Moderately Flat
   c. Exposed slabs in public spaces, slabs to receive thin-set flooring: Flat

H. Concrete Floor Finish Tolerance - Unshored Metal Deck on Shored or Unshored Steel Beam or Open-Web Joist Floor Construction:
1. Concrete Placement: Concrete over metal deck shall be placed and screeded level and flat to the tolerance specified below, maintaining at least the minimum slab thickness at all locations as specified on the drawings. The Contractor shall increase the slab thickness as required to compensate for metal deck deflection, and in unshored beam construction, beam deflection in excess of actual beam camber in order to achieve a level and flat floor within specified tolerances.
2. Finish Tolerance of Random Traffic Floor Surfaces:
   a. Slabs in nonpublic areas, mechanical rooms, surfaces to received raised computer flooring, surfaces to have thick-set tile or a topping, and parking structures: Conventional
   b. Carpeted Areas: Moderately Flat
   c. Exposed slabs in public spaces, slabs to receive thin-set flooring: Flat
   d. Eighty percent (80%) of the final floor surface shall fall within an envelope of 0.75" centered about the mean elevation of all the readings. (± 0.375 about mean). The mean elevation of all readings shall not deviate from the specified design grade by more than ± 0.375".
3. Extra Concrete: The contractor shall include in his bid any additional concrete required to achieve the specified slab surface finish tolerance and to compensate for metal deck deflection, and for beam deflection in excess of actual beam camber.

I. Remedial Measures for Slab Finish Construction Not Meeting Specified Tolerances:
1. Application of Remedial Measures. Remedial measures specified herein are required whenever either or both of the following occur:
   a. The composite overall values of FF or FL of the entire floor installation measure less than specified values.
   b. Any individual test section measures less than the specified absolute minimum FF or FL value.
2. Modification of Existing Surface:
   a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.

b. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair and time to affect the repair.
c. Repair method(s), at the sole discretion of the Architect/Engineer or Owner's Representative, may include grinding (floor stoning), planning, retopping with self leveling underlayment compound or repair topping, or any combination of the above.
d. The Architect/Engineer or Owner's Representative maintains the right to require a test repair section using the approved method of repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect/Engineer or Owner's Representative, the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.
e. The judgment of the Architect/Engineer or Owner's Representative on the appropriateness of a repair method and its ability to achieve the desired end product shall be final.
f. All repair work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3. Removal and Replacement:
a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately commence to remove and replace the defective work.
b. Replacement section boundaries shall be made to coincide with the test section boundaries as previously defined.
c. Sections requiring replacement shall be removed by sawcutting along the section boundary lines to provide a neat clean joint between new replacement floor and existing floor.
d. The new section shall be reinforced the same as the removed section and doweled into the existing floor as required by the Engineer. No existing removed reinforcing steel may be used. All reinforcing steel shall be new steel.
e. Replacement sections may be retested for compliance at the discretion of the Architect/Engineer or Owner's Representative.
f. The judgment of the Architect/Engineer or Owner's Representative on the need for replacement shall be final.
g. All replacement work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3.18 CONCRETE CURING AND PROTECTION

A. General:
1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete. Limit moisture loss to a maximum of 0.05 lb./sq. ft – hr for concrete containing silica fume and 0.2 lb./sq. ft. - hr for all other concrete before and during finishing operations.. If using an evaporation retarder, apply in accordance with manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be 7 days for all concrete except high early strength concrete which shall be cured for 3 days minimum.
3. Alternatively, curing times may be reduced if either of the following provisions is complied with:

a. If tests are made of cylinders kept adjacent to the structure and cured by the same methods, curing measures may be terminated when the average compressive strength has reached 70% of the specified 28 day compressive strength.
b. If the temperature of the concrete is maintained at a minimum of 50°F for the same length of time required for laboratory cured cylinders of the same concrete to reach 85% of the 28 day compressive strength, then curing may be terminated thereafter.

4. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period.

B. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by one or a combination of the methods specified below, as applicable.

C. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping and other flat surfaces by one or a combination of the methods specified below, as applicable. The Contractor shall choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Floors in Non-Public spaces that are left exposed to view and not receiving sealers or hardeners, floors involved in under-floor air distribution systems: Apply one coat of a high-solids, water-based, non-yellowing, liquid membrane-forming curing and sealing compound conforming to ASTM C 1315, type 1, Class A or B in accordance with method 3 as specified below.
2. Floors that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile, acrylic terrazzo, vinyl composition tile, sheet vinyl, linoleum, vinyl-backed carpet, rubber, athletic flooring, synthetic turf, wood, epoxy overlay or adhesive, or other coating or finishing products: Cure using methods 2 or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C 309, type 1, class A or B for method 3.
3. All Other Surfaces: Cure using methods 1, 2, or 3 as specified below. Use a water-based dissipating resin type curing compound conforming to ASTM C 309, type 1, class A or B for method 3.

D. Curing Methods

1. Method 1 - Moisture Curing: Provide moisture curing by one of the following methods:
   a. Keep concrete surface continuously wet by covering with water.
   b. Continuous water-fog spray.
   c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
2. Method 2 - Moisture-Retaining Cover Curing: Provide moisture-retaining cover curing as follows:
   a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Water may be added to concrete surface to prevent drying before the cover is installed, but the surface shall not be flooded with water if a non-absorptive cover is used.
3. Method 3 – Curing or Curing and Sealing Compound: Provide curing, curing/hardener, liquid membrane-forming curing, or curing and sealing compound as follows:

a. Apply specified compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Do not allow to puddle. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Apply second coat for sealing 2 to 3 hours after the first coat was applied.

b. Do not use membrane-forming curing and sealing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glued-down carpet, vinyl composition tile, linoleum, sheet vinyl, rubber, athletic flooring, synthetic turf, epoxy overlay or adhesive, or wood), paint or other coatings and finish materials., Dissipating resin type cures are acceptable in these locations.

3.19 HOT WEATHER CONCRETING

A. Definition:

1. Conditions warranting hot weather concreting practices are defined as any combination of high air temperature, low relative humidity and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties. If conditions cause an evaporation rate of 0.2 lb./sq. ft./hr. as calculated by Figure 2.1.5 in ACI 305R-99, then precautions shall be taken to prevent plastic shrinkage cracks from occurring.

B. Specification: Follow hot weather concreting practices specified below when required to limit the concrete temperature at the truck discharge point to the stated maximum acceptable temperature.

C. Records: Under hot weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature at truck discharge and general weather conditions.

D. Hot Weather Concreting Requirements: The following items, all or in part as required, shall be followed to limit the concrete temperature to the stated maximum acceptable temperature and to minimize the possibility of plastic shrinkage cracks from developing.

1. Design the concrete mixes specifically for hot weather conditions replacing some cement with fly ash or other pozzolan and using a water reducing retarding admixture (ASTM C 494 Type D).
2. Use the largest size and amount of coarse aggregate compatible with the job.
3. Use sunshades and/or windbreaks.
4. Delay construction of indoor slabs-on-grade until the walls and roof are constructed.
5. Cool and shade aggregate stockpiles.
6. Use ice as part of the mixing water or cool the water with liquid nitrogen.
7. Limit the number of revolutions at mixing speed to 125 maximum.
8. Reduce time between mixing and placing as much as possible.
9. Do not add water to ready-mixed concrete at the job site unless it is part of the amount required initially for the specified water-cement ratio and the specified slump.
10. Schedule concrete placement for early morning, late afternoon, or night.
11. Have all forms, equipment and workers ready to receive and handle concrete.
12. Maintain one standby vibrator for every three vibrators used.
13. Keep all equipment and material cool by spraying with water including exteriors of forms, reinforcing steel, subgrade, chutes, conveyors, pump lines, tremies, and buggies.
14. Protect slab concrete at all stages against undue evaporation by applying a fog spray or mist above the surface or applying a monomolecular film. Where high temperatures

and/or placing conditions dictate, use water-reducing retarding admixture (Type D) in lieu of the water-reducing admixture (Type A) as directed by the Owner's Testing Laboratory.

15. Provide continuous curing, preferably with water, during the first 24 hours using wet burlap, cotton mats, continuous spray mist, or by applying a curing compound meeting ASTM C 1315. Continue curing for 3 days minimum.
16. Cover reinforcing steel with water soaked burlap so that steel temperature will not exceed ambient air temperature immediately before placement of concrete.
17. As soon as possible, loosen forms and run water down the inside. When forms are removed, provide a wet cover to newly exposed surfaces.

3.20 COLD WEATHER CONCRETING

A. Definition:

1. Concrete shall not be placed when the outside air temperature is 40°F or less unless cold weather concreting practices are followed as specified below.
2. Cold weather concreting practices should also be followed whenever the average daily air temperature is less than 40°F for more than three successive days. The average daily air temperature is the average of the highest and lowest temperature occurring during the period from midnight to midnight. The requirement for adhering to these cold-weather concreting practices may be terminated when the air temperature is above 50º F for more than half of any 24 hour duration.
3. Cold-weather concreting practices invoked shall keep the temperature of the concrete immediately after placing within the following temperature ranges:
   a. 55º to 75º F for sections less than 12 in. in the least dimension
   b. 50º to 70º F for sections 12 to 36 in. in the least dimension
   c. 45º to 65º F for sections 36 to 72 in. in the least dimension
   d. 40º to 60º F for sections greater than 72 in. in the least dimension
4. Concrete Protection: Protect the concrete immediately after placing and during the defined protection period such that the concrete does not freeze nor fall below the temperature levels stated in the above paragraph. For concrete not loaded during construction the protection period shall be for a minimum of three days if cold-weather conditions persist. The time period may be reduced to a minimum of two days if Type III cement or an accelerating admixture is used or if an additional 100 pounds of cement per cubic yard is added to the concrete mix. Concrete fully loaded during construction shall be protected during cold weather conditions for whatever time period is required to obtain the required strength as determined by nondestructive strength tests (Windsor probe, Swiss Hammer Test) on the in-place concrete. Protect concrete surfaces from freezing for the first 24 hours even if cold-weather conditions do not officially exist due to high volatility in ambient temperatures.
5. Protection Deficiency: If the temperature requirements during any portion of the protection period are not met but the concrete surface did not freeze, the protection period shall be extended until twice the deficiency expressed in degree-hours is made up. Deficiency degree-hours are defined as the average deficiency in temperature below the required value times the number of hours the deficiency persisted. Make-up degree hours are the average increase in temperature above the minimum value times the hours required to make up twice the deficiency degree-hours. Contact the Architect/Engineer if the concrete surface was allowed to freeze during the protection period.
6. Protection Removal: As the protection is being removed the decrease in temperature measured at the surface of the concrete in a 24 hour period shall not exceed the following:
   a. 50º F for sections less than 12 in. in the least dimension
   b. 40º F for sections 12 to 36 in. in the least dimension
   c. 30º F for sections 36 to 72 in. in the least dimension

d. 20º F for sections greater than 72 in. in the least dimension

7. The maximum concrete temperature heated by artificial means at point of placement shall not exceed 90°F.

B. Records: Under cold weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature as placed and general weather conditions. The temperature record shall be taken no less than 2 times per 24 hour duration.

C. Cold Weather Concreting Requirements: The following items, all or in part as required, should be followed to assure acceptable concrete in cold weather conditions:

1. Design the concrete mix suitable for cold weather. Use air entrainment (where not prohibited) and obtain high early strength by using a higher cement content, a high early strength cement (Type III), or a specified non-chloride accelerator (ASTM C 494 Type C or E).
2. Protect the concrete during curing period using insulating blankets, insulated forms, enclosures and/or heaters.
3. Concrete cured in heated enclosures shall have heaters vented to prevent exposure of concrete and workmen to noxious gases.
4. Frozen subgrade shall be thawed prior to concrete placement and snow and ice shall be removed from forms.
5. Temperature of embedments in concrete must be heated to above 32° F prior to placing concrete.
6. Concrete shall be protected and cured at 50°F for seven days minimum if normal concrete (Type I cement) is used and for three days minimum if high early strength concrete (concrete with Type III cement, 100 pounds cement added per cubic yard concrete, or a non-chloride accelerator added).
7. Concrete not loaded during construction shall be protected a minimum of 3 days for normal concrete and 2 days for high early strength concrete to obtain safe form stripping strength. Concrete fully loaded during construction shall be protected for whatever time period is required to obtain the required strength as determined by nondestructive strength tests (Windsor probe, Swiss Hammer Test) on the in-place concrete.
8. Heat the mixing water and then blend hot and cold water to obtain concrete no more than 10°F above the required temperature.
9. Heat the aggregates by circulating steam in pipes placed in the storage bins for air temperatures consistently below 32°F. When either water or aggregate is heated to over 140°F combine them in the mixer first to obtain a maximum temperature of the mixture not to exceed 140°F in order to prevent flash set of the concrete.
10. Uniformly thaw aggregates far in advance of batching to prevent moisture variations in the stockpile.
11. Cover warmed stockpiles with tarps to retain heat.
12. Place air entraining admixture in the batch after the water temperature has been reduced by mixing with cooler solid materials.
13. Use wind screens to protect concrete from rapid cooling.
14. Place vertical pump lines inside the building, if possible, for concrete being pumped.
15. Maintain artificial heat as low as possible to reduce temperature stresses during cooling.
16. Avoid water curing of concrete except for parking garage structures. Apply the required curing compound to unformed surfaces as soon as possible to prevent drying of concrete from heated enclosures.
17. Delay form stripping as long as possible to help prevent drying from heated enclosures and to reduce damage to formed surfaces caused by premature stripping.
18. Provide triple thickness of insulating materials at corners and edges vulnerable to freezing.

19. Wrap protruding reinforcing bars with insulation to avoid heat drain from the warm concrete.
20. Gradually reduce the heat at the end of the heating period to reduce likelihood of thermal shock.

3.21 SHRINKAGE AND TEMPERATURE REINFORCEMENT

A. Provide shrinkage and temperature reinforcement (as required by ACI 318) at right angles to main top and bottom bars for all structural slabs unless detailed otherwise on the drawings.

3.22 PLACEMENT OF WELDED WIRE FABRIC

A. Wherever welded wire fabric is specified as reinforcement in slabs, it shall be continuous and properly lapped one full wire spacing plus 2" across the entire concrete surface and not interrupted by beam or girders.

3.23 PLACEMENT OF COLUMN DOWELS AND ANCHOR RODS

A. Dowels for columns, plinths, and pilasters and anchor rods shall be accurately set using 1/8" thick steel templates.

3.24 REINFORCEMENT IN COMPOSITE STEEL DECK SLAB

A. Composite steel deck slabs shall be reinforced as indicated on the drawings.

B. Extra Reinforcement over Girders: Provide additional reinforcing steel over interior girders as shown on the drawings.

C. Placement of Slab Reinforcement: Provide bolsters, high chairs, and/or additional reinforcing as shown in details on the drawings to support the reinforcing with the clear cover shown on the details.

3.25 REINFORCEMENT AROUND OPENINGS IN COMPOSITE STEEL DECK SLABS

A. For all openings in steel deck not framed with structural steel and greater than 10" in width in either direction, provide additional reinforcing steel as shown in details on the drawings.

3.26 REINFORCEMENT IN GRADE BEAMS

A. Provide reinforcing in grade beams as shown on the drawings.

B. Bar Support for Grade Beam Cages: Grade beam bottom steel shall be supported at 5'-0" maximum centers using beam bolsters that provide 3" bottom cover to the reinforcing steel. Beam bolsters used shall be designed and manufactured for support on soil.

3.27 REINFORCEMENT IN TOPPING SLABS

A. Provide welded smooth wire fabric minimum 6 x 6 W1.4 x W1.4 in all topping slabs unless specified otherwise on the drawings.

3.28 REINFORCEMENT IN HOUSEKEEPING PADS

A. Provide welded smooth wire fabric 6 x 6 W2.9 x W2.9 minimum in all housekeeping pads supporting mechanical equipment unless detailed otherwise on the drawings.

3.29 MISCELLANEOUS CONCRETE ITEMS

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

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp and finish concrete surfaces as scheduled.

E. Installation of Adhesive Anchors Using Injectable Epoxy or Adhesive: A representative of the adhesive manufacturer shall be present for the first day that adhesive anchors are installed. After drilling the hole to the diameter and depth recommended by the manufacturer, clean the hole with a wire or nylon brush. Blow the dust out of the hole using compressed air with a nozzle that reaches to the bottom of the hole. When using adhesive from a new pack, the adhesive that is discharged from the mixing nozzle should be a uniform gray color before any adhesive is installed in the hole. Fill the hole with adhesive starting from the very bottom of the hole until the hole is about 2/3 full. Do not leave an air pocket at the bottom of the hole. Insert the anchor rod or dowel by slowly twisting it into the hole.

3.30 CONCRETE SURFACE REPAIRS

A. Definition - Defective Areas:

1. Formed Surfaces: Concrete surfaces requiring repairs shall include all cracks in excess of 0.01" and any other defects that affect the durability or structural integrity of the concrete. Voids, including honeycombing and rock pockets, and tie holes shall be repaired as required by the specified Surface Finish.
2. Unformed Surfaces: Concrete surfaces requiring repair shall include all surface defects such as crazing, cracks in excess of 0.01" wide or cracks which penetrate to reinforcement or through the member, popouts, spalling and honeycombs.

B. Classification:

1. Structural Concrete Repair: Major defective areas in concrete members that are load carrying (such as shear walls, beams, joists and slabs), are highly stressed, and are vital to the structural integrity of the structure shall require structural repairs. Structural concrete repairs shall be made using a two part epoxy bonder, epoxy mortar or specified polymer repair mortar. Location of structural concrete repairs shall be determined by the Engineer.
2. Cosmetic Concrete Repair: Defective areas in concrete members that are non-load carrying and minor defective areas in load carrying concrete members shall require cosmetic concrete repair when exposed to view and not covered up by architectural finishes. Cosmetic concrete repairs may be made using a polymer repair mortar and compatible bonding agent. The location of cosmetic concrete repair required shall be determined by the Architect/Engineer. Stains and other discolorations that cannot be removed by cleaning and are exposed to view will require cosmetic repair. Cosmetic concrete repair in exposed-to-view surfaces will require Architect's approval prior to patching operation.
3. Slab Repairs: High and low areas in concrete slabs shall be repaired by removing and replacing defective slab areas unless an alternate method, such as grinding and/or filling with self-leveling underlayment compound or repair mortar is approved by the Architect/Engineer. Repair of slab spalls and other surface defects shall be made

using epoxy products as specified above and as determined by the Engineer. The high strength flowing repair mortar may be used for areas greater than 1 inch in depth.

3.31 QUALITY ASSURANCE TESTING AND INSPECTION DURING CONSTRUCTION

A. See Testing Laboratory Services section of these Specifications for concrete materials and cast-in-place concrete inspection and test requirements.

3.32 INVESTIGATION OF LOW CONCRETE STRENGTH TEST RESULTS

A. Contractor Responsibility for Low Strength Concrete

1. If the average of any three consecutive strength tests falls below the required f'c for a class of concrete but no individual strength test is more than 500 psi below f'c, the Contractor shall immediately notify the Engineer by telephone or e-mail and take immediate steps to increase the average of subsequent strength tests.
2. If any individual strength test falls more than 500 psi below the required f'c, the Contractor shall immediately notify the Engineer by telephone or e-mail and take immediate steps to assure that the load-carrying capacity of the structure is not jeopardized.

B. Additional Field Tests to Confirm Low Concrete Strengths

1. The cost of all investigations of low-strength concrete, as defined by any individual strength test being more than 500 psi below the required f'c, shall be borne by the Contractor.
2. Code-Prescribed Acceptance: The only accepted field-test methods of determining actual in-situ concrete strength is by the way of core tests as prescribed below.
3. Non-Destructive Tests: If any individual strength test falls more than 500 psi below the required f'c, the Engineer may request that non-destructive field tests be performed on the concrete in question using Swiss Hammer, Windsor Probe, or other appropriate methods as approved by the Engineer. Report the comparative test results of the suspect concrete under consideration with identical tests done on concrete of known strength and of the same class. The Engineer considers these test results as only approximate indicators of strength and may not necessarily, by themselves, resolve the low concrete strength issue. These test results will be considered as additional information by which to make an informed judgment. The Engineer reserves the right to accept the concrete based on the results of these approximate tests or order that core tests be taken as prescribed below. At the Contractor's option, the approximate non-destructive field-tests may be waived and core tests immediately initiated.
4. Core Tests: If, in the opinion of the Engineer, the likelihood of low-strength concrete is confirmed and it has been determined that the load-carrying capacity of the structure is significantly reduced as a result, the Engineer may request that core tests be taken from the area in question as directed by the Engineer. There shall be a minimum of three cores taken for each strength test more than 500 psi below the required f'c and tested in accordance with ASTM C 42. If concrete in the structure will be dry under service conditions, cores shall be air dried (temperature 60° to 80°F, relative humidity less than 60 percent) for 7 days before test and shall be tested dry. If concrete in the structure will be more than superficially wet under service conditions, cores shall be immersed in water for at least 48 hours and tested wet. The Contractor shall fill all holes made by drilling cores with an approved drypack concrete.
5. Acceptance Criteria for Core Test: Concrete in an area represented by core tests shall be considered adequate if the average of three cores is equal to at least 85% of the required f'c and no single core is less than 75% of the required f'c. If approved by the Engineer, locations of erratic core strengths may be retested to check testing accuracy.
6. Load Test: If the concrete strength is not considered adequate based on core tests and the structural adequacy remains in doubt, the Engineer may order a load test as specified in ACI 318 be conducted for the questionable portion of the structure.

7. Strengthening of the Structure or Demolition: If the structural adequacy of the affected portion of the structure remains in doubt following the load test, the Engineer may order the structure to be strengthened by an appropriate means or demolished and rebuilt at the Contractor's expense.

END OF SECTION 03 30 00

SECTION 03 35 00 SEALED CONCRETE FINISH

PART 1 – GENERAL REQUIREMENTS

1.01 SECTION INCLUDES

A. Furnish all labor, materials, tools and equipment as necessary to perform installation of Concrete Floor Sealer on new and/or existing concrete slabs at locations shown on drawings and as specified in this section.

B. Repairs and preparation of concrete floors.

1.02 REFERENCES

A. ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 1998.

1.03 SUBMITTALS

A. General:

1. Submit manufacturer's certification that proposed materials, details and systems as indicated and specified fully comply with manufacturer's details and specifications. If any portion of Contract Documents do not conform to manufacturer's standard recommendations, submit notification of portions of design that are at variance with manufacturer's specifications.

B. Product Data:
1. Submit manufacturer's literature, installation instructions and MSDS for each product.

C. Concrete Slab Test Results:
1. Submit slab moisture test results. Testing conducted in accordance with ASTM F1869.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:
1. Company specializing in manufacturing floor sealing and floor leveling materials that will upon application and inspection of installation, provide a five-year warranty that moisture emission will not exceed three pounds per 1000 square feet per 24 hours (from a maximum initial level of 8 lbs.).

B. Installer Qualifications:
1. Contractor shall be knowledgeable and well trained with regards to subfloor preparation, including surface preparation, and material application.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver and store in a dry, well ventilated area at minimum 50 deg. F (10 deg C) and maximum 90 deg F (32 deg C).

B. Deliver materials in manufacturer's unopened containers, fully identified with brand, type, grade, class and all other qualifying information. Provide Materials Safety Data Sheets for each product.

1.06 SYSTEM REQUIREMENTS

A. Coordinate floor sealing installation with other trades.

B. Provide materials and accessories in timely manner so as not to delay Work.

1.07 PROJECT CONDITIONS

A. Surfaces to be sealed should have a minimum temperature of 55 deg F. The area should be conditioned at 70 deg F with a maximum humidity of 60% for 48 hours prior to application.

B. Once applied, the area must be kept at 70 deg F and 60% relative humidity for 72 hours.

PART 2 – PRODUCTS

2.01 General – Provide and install high-performance, high solid, waterborne acrylic concrete sealer, quick drying, non-flammable and UV stable, satin to gloss finish.

A. Acceptable Product:

1. Ardex CG Concrete Guard as manufactured by ARDEX Engineered Cements, 400 Ardex Park Drive, Aliquippa, PA 15001. www.ardex.com

2. Permaguard SPS as manufactured by L & M Construction Chemicals, Inc. www.lmcc.com

3. Industra-Seal 117A or Industra-Gloss WB sealer as manufactured by V-Seal Concrete Sealers & Specialty Coatings www.vseal.com OR

4. Kemiko Stone Tone Sealer II as manufactured by Kemiko Concrete Products, Leonard TX. Install in accordance with manufacturer's recommendations. www.kemiko.com.

B. Substitutions shall be submitted in accordance with requirements of section 01 25 00 – Substitution Procedures.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine all construction substrates and conditions under which concrete floor sealer material is to be installed. Do not proceed with the concrete floor sealer installation until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Install product is strict compliance with manufacturer's recommendations and instructions.

B. Protect adjacent surfaces not designated to receive concrete floor sealer.

C. Substrate preparation:

1. Ensure concrete is a minimum 28 days old.

2. All surfaces to be treated must be sound, solid, clean and absorptive. Substrate must be clean and free of any dirt, paint, curing compound, bond breaker, wax, asphalt, hardeners, sealers or any other contaminant that might interfere with the product's penetration and bond. Make sure there is no standing water; damp areas must be dried prior to application.

3. Polished or very smooth concrete slabs should be mechanically profiled to allow the material to soak into the pores and properly bond to the slab. Preparation methods include grinding, scarifying, or bead blasting.

3.03 INSTALLATION

A. Mechanically mix concrete floor sealer prior to use. DO NOT DILUTE.

B. Apply concrete floor sealer material in quantities and in manner set forth in manufacturer's full written directions, technical bulletins and recommendations.

C. Spread using roller (3/8" nap for most substrates) to the dry substrate. Avoid pouring the material directly on the substrate, instead dip into pail or pour the material into a paint pan. Roll with even and consistent strokes to ensure uniform coverage. Be careful to avoid material build-up where the product overlaps.

D. Allow 2 –3 hour dry time in between coats.

E. Apply the second coat in the direction perpendicular to the first. Allow 24 hours, at recommended atmospheric conditions, prior to patch or floor covering application.

F. Where specified install floor covering as per manufacturer's directions and recommendations. If the surface is irregular and smoothing is required use a suitable hydraulic cement repair material compatible with the sealer.

3.04 ACCEPTANCE

A. Remove left over materials and any foreign material resulting from the work from the site.

B. Clean adjacent surfaces and materials.

3.05 PRECAUTIONS / LIMITATIONS

A. Do not nail into surface.

B. Do not apply over existing coatings or floor coverings.

END OF SECTION 03 35 00

SECTION 04 20 00 UNIT MASONRY

PART 1 – GENERAL

1.01 SCOPE

A. Furnish all materials, equipment, scaffolding, and labor to install all masonry shown on drawings and specified herein. Install equipment, anchors, vents and devices furnished by other trades.

B. Section Includes:

1. Face brick
2. Concrete Masonry Units
3. Masonry joint reinforcement
4. Ties and anchors
5. Embedded flashing
6. Miscellaneous masonry accessories
7. Mortar and Grout

1.02 REFERENCES

A. The Masonry Society:

1. TMS 402 - Building Code Requirements for Masonry Structures.
2. TMS 602 - Specifications for Masonry Structures.

B. ASTM International:

1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A 153/A 153M - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
5. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
6. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
7. ASTM A951 - Standard Specification for Steel Wire for Masonry Joint Reinforcement
8. ASTM A1064 - Standard Specification for Steel Wire for Masonry Joint Reinforcement
9. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
10. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
11. ASTM C90 - Standard Specification for Load bearing Concrete Masonry Units.
12 ASTM C91 - Masonry Cement.
13. ASTM C94 - Ready-Mixed Concrete.
14. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
15. ASTM C144 - Aggregate for Masonry Mortar.
16. ASTM C150 - Portland Cement.
17. ASTM C207 - Hydrated Lime for Masonry Mortar.
18. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
19. ASTM C270 - Mortar for Unit Masonry.
20. ASTM C404 - Aggregates for Masonry Grout.

21. ASTM C476 - Grout for Masonry.
22. ASTM C780 - Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
23. ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.
24. ASTM C1019 - Method of Sampling and Testing Grout
25. ASTM C1364 - Standard Specification for Architectural Cast Stone.
26. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
27. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

C. National Fire Protection Association:
1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

D. Underwriters Laboratories Inc.:
1. UL723 - Tests for Surface Burning Characteristics of Building Material.

1.03 GENERAL REQUIREMENTS

A. A thoroughly competent masonry foreman shall be in charge of masonry Work at all times during construction

B. Masonry Work shall not be done when temperature is below 40°F. and dropping or when freezing temperatures are forecast within 72 hours.

C. Scaffolding: Shall safely support Workmen and all necessary materials and equipment.

D. “Concrete Masonry Handbook” by the Portland Cement Association shall provide minimum standards required for concrete masonry.

E. Protect all materials from damage; store masonry, cement, lime off of ground.

F. Construct 4’ x 4’ sample panel of each type of masonry to show masonry, pattern, and joints for Architect and Owner’s approval prior to start of masonry Work. If necessary, repeat constructing sample panels until one is approved for each type of masonry Work. Comply with structural notes on Drawings.

H. Exterior concrete masonry units to have “Acme Shield” or “Dry Block” or approved equal waterproofing additive. Coordinate with mortar admixture for proper bond.

I. Build-in all thru-wall flashing as indicated in Plans, Details, Specification Sections 07 62 00 and 07 65 26 and as required for complete water tight installation. Verify complete coverage of dampproofing prior to installation of masonry materials.

J. Exposed CMU at inside of open mechanical courtyards should be painted with an elastomeric paint, and the top of wall covered with a pre-finished metal cap in order to avoid efflorescence in the finished brick face.

K. All wire ties, steel straps, locking channels and screws shall be hot dipped galvanized.

L. At building addition to existing building tie-ins; All exterior backup walls shall be tied together with flashing. Portions of exterior cladding along these transitions are to be removed to ensure envelope is sealed completed.

1.04 SUBMITTALS

A. NOT USED

B. Product Data:
1. Submit data for masonry units, fabricated wire reinforcement, wall ties, anchors, cavity drainage material, and other accessories.
2. Submit data for cleaning solutions, including detailed description of methods, materials, equipment and site cleanup procedures to be used. Provide with letters of approval from brick and cleaning material manufacturers regarding the compatibility of proposed use of products together for cleaning purposes.

C. Samples:
1. Submit sample of each type of masonry unit and face brick, to illustrate color, texture and extremes of colors range. Furnish additional samples when necessary to fully illustrate the complete range of highly variable materials.
2. For Brick Veneer Unit Color selection prior to Mock-Ups: Contractor shall furnish any colors/blends listed in Para. 2.02B ***and*** current “brick boards” that illustrate the full color offerings available (see Para. 2.02B). Architect shall select colors for the Contractor to make available in Color Selection Mock-ups (refer to Para. 1.07B); note that multiple colors may be selected for mock-up.

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

E. Mortar and Grout:
1. Submit two (2) copies of proposed mortar and grout mix designs to Owner's testing laboratory.
2. Submit mix design for mortar indicating whether the proportion or the property specification of ASTM C270 is to be used.
3. Submit mix design for grout indicating conformance of grout to requirements of ASTM C476.
4. Submit test reports of preconstruction tests of mortar for consistency, mortar aggregate ratio, water content, air content, and compressive strength in conformance with ASTM C780.
5. Submit test reports of grout tests in conformance with ASTM C1019.
6. Submit Manufacturer’s certification for products indicating conformance with specified requirements.
7. Submit two boxes of full range mortar color offerings for Architect to select from; multiple colors may be selected.

F. Cleaner, Sealer Applicator Qualifications: Submit qualifications of applicator.
1. Certification stating applicator is experienced in the application of the specified products.
2. List of recently completed masonry cleaning projects, including project name and location, names of owner and architect, description of cleaning products used and substrates, applicable local environmental regulations, and application procedures.

G. Environmental Regulations: Submit description for testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Submit applicable local environmental regulations.

H. Protection: Submit description for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces during the work from contact with masonry cleaners, residues, rinse water, fumes, wastes, and cleaning effluents.

I. Surface Preparation: Submit description for surface preparation of substrates to be completed before application of masonry cleaners, sealers and graffiti control.

J. Application: Submit description for application procedures of masonry cleaners, sealers and graffiti control products.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with TMS 402 - Building Code Requirements for Masonry Structures and TMS 602 - Specifications for Masonry Structures except where exceeded by requirements of the contract documents.

B. Fire Performance Characteristics: Where indicated or required, provide materials and construction which are identical to assemblies whose fire endurance has been determined by testing in compliance with ASTM E119 by U.L. or other recognized testing and inspection organization or by other means, acceptable to authority having jurisdiction.

C. Masonry Cleaning: Workers shall have minimum 5 years of masonry cleaning experience, and shall be approved by cleaner manufacturer prior to application of cleaning material, and shall meet with cleaner manufacturer for demonstration and instruction s for use of product prior to application.

D. Single Source Responsibility:
1. For Masonry Units: Obtain masonry units of uniform texture and color, or a uniform blend within the accepted ranges for those characteristics, from one (1) manufacturer and one (1) production plant for each different product required for each continuous surface or visually related surfaces.
2. For Mortar and Grout Materials: Brands of cementitious materials and admixtures, and the source of supply of sand and aggregates shall remain the same throughout the Work where exposed to view and where not scheduled to receive a subsequently applied finish, i.e. parging, painting, etc., unless directed otherwise in writing by the Architect.
3. Contractor's Responsibility: Contractor performing Work of this Section shall be responsible for coordinating with others performing work which is built-in or adjacent to unit masonry work.

E. Masonry Cleaner & Sealer Qualifications:
1. Manufacturer Qualifications:
   a. Manufacturer capable of providing field service representation during installation and who will approve the installer and application method.
2. Installer Qualifications:
   a. Installer experienced in performing this type of work and who has specialized in work similar to the type required for this project.

F. The finished masonry surface will in many cases be the finished wall surface in the room it defines. The aesthetic value of the masonry installation is paramount. Consistent mortar color, joint width and texture, uniformity of masonry surfaces and coloring are all qualities to be judged. Cull units with chips or cracks which exceed allowable defects under product standards. Turn chipped faces toward cavity spaces or chases with unchipped faces exposed to occupied spaces. Uniformly distribute chipped units that are visible within the finished wall.

G. Continuously monitor quality of installation and remove and replace non-conforming work immediately.

1.06 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.07 MOCKUP

A. Each type of masonry used shall be represented by mockup prior to approval of masonry work to begin. Do not begin masonry work until Architect has approved mockup.

B. Construct cavity wall mockup, 8 feet long by 8 feet high minimum to include inside and outside corner, including all exterior wall finish materials, all masonry types and colors, mortar and accessories, structural backup, window, flashings, wall insulation, and weeps. Coordinate all trades to provide samples for mock up.

C. Include a sealant–filled control joint.

D. Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects and to set quality standards for materials and execution.

E. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

F. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.

G. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

H. Structural backup wall to consist of CMU and cold formed metal framing.

I. Clean one/half of exposed faces of mockups with masonry cleaner using methods anticipated for the Work.

J. Protect accepted mockups from the elements with weather resistant membrane.

K. Brace and support as required to withstand structural wind loads.

L. Omit masonry above flashing to leave a 12 inch length of the flashing exposed to view.

M. Locate in a well-lit area where approved by Architect.

N. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.

O. Remove mockup when directed by Architect, unless part of permanent construction.

P. Sample Panel(s):

1. Sample panel should be included as part of completed work within the building.
2. Do not start masonry until Architect has approved submittal samples and mock-up.
3. Sample panel size: 8’ wide x 6’ high; Coordinate location with Architect.
4. Sample panel shall show selected color range and texture, bonding, joint shape, and quality of workmanship. Include any specialty details, such as reveals, soldier courses, etc. Include installation of sill and lintel above openings, window jambs and sills. (Refer to mock-up requirements).
5. A separate sample panel for each type of masonry used is required.

1.08 DELIVERY, STORAGE AND HANDLING

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

B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1/ASCE6/TMS 602 when ambient temperature or temperature of masonry units is less than 40 degrees F.

B. Hot Weather Requirements: In accordance with ACI 530.1/ASCE6/TMS 602 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

C. Bracing of Work in Progress:
1. Where masonry erection may be exposed to high winds, installation shall be adequately braced until masonry construction has attained sufficient strength to resist wind forces.
2. Shores and forms shall not be removed until masonry construction has attained sufficient strength to support its own weight and all other construction or environmental loads.

1.10 COORDINATION

A. Coordinate work with work of other trades built into or adjoining masonry work.

B. Openings and chases for heating, plumbing, electrical ducts, pipes, and conduits shall be built into masonry walls as required. Provide for installation of bolts, toggles, flashings, beams, anchors, hangers, nailing strips, wall plugs, and frames as required. Consult other trades in advance and make provisions for installation of their work to avoid cutting and patching. Coordinate installation of steel reinforcement for reinforced masonry. Coordinate placement of concrete in masonry beams, lintels, soffits, and pilasters.

C. Contractor performing Work of this Section shall be responsible for, and coordinate with, work of Section 07 11 13 - Bituminous Dampproofing, Section 07 65 26 – Membrane Flashing and all other Sections of Work built-in, adjacent to, or applied to unit masonry work.

1.11 WARRANTY

A. Warrant the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:

C. Noticeable deterioration of unit or mortar finish.

D. Chalking or dusting excessively.

E. Changing color in irregular fashion.

F. Cracking or spalling.

G. Releasing from substrate.

H. Staining or discoloring, including efflorescence.

PART 2 - MATERIALS

2.01 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.02 BRICK

A. Meet or exceed ASTM C216, Type FBS, Grade MW

B. BRICK VENEER:

1. Acceptable manufactures:
   a. Kansas Brick and Tile.
   b. Acme Brick Tile & Stone.
2. Substitutions: Refer to section 01 25 00.

3. Final selection of all colors will be conducted during the submittal and mock-up process. Architect shall make final selection as available from manufacturer's full range of colors. ***Multiple colors may be requested to be mocked up and multiple colors may be selected.***

2. The body compositions shall be of the finest shales and clays producing a uniform dense body. Size shall be moular Size. Provide actual samples of full color range for selection. Joint width shall be as specified and provided by template manufacturer. Mix bricks from several cartons for best shading during installation. Install and clean per manufacturers recommendations.

2.03 CONCRETE MASONRY UNITS: Refer to Drawings Material Schedule for Basis of Design.

A. Shapes: Provide modular sizes and shapes as required, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. For all interior CMU walls (integral color, burnished and/or painted), all projecting 90° corners and wing walls shall have factory-prefinished manufactured integral bullnose block (***on-site field bullnosing by mechanical means will not be allowed***). Provide 1-inch radius unless noted otherwise on drawings.

B. STANDARD CONCRETE MASONRY UNITS: ASTM C-90, Grade N, Type 1, 2000 psi strength with a maximum linear shrinkage of 0.06 percent as determined by ASTM Test Method C-426. Lightweight aggregate (less than 105 PCF), high temperature, high pressure, steam cured or burned expanded clay or shale, all modular sizes and shapes necessary as manufactured by:

1. Featherlite Building Products.
2. Texas Building Products, Inc.
3. Revels Block & Brick Co., Inc.
4. Best Block Construction Materials

2.04 MORTAR AND GROUT

A. Mortar: Solomon Colors, SGS Concentrated A, H, and X Series Mortar Colors; Architect to select color(s) to match CMU and brick; Mix and use according to manufacturers printed instructions.

B. Mortar Materials
   1. Cementitious Materials:
      a. Masonry Cement: ASTM C91, Type N, color as required to produce approved color sample.
      b. Mortar Cement: ASTM C1329, Type N.
      c. Portland Cement: ASTM C150, Type I, color as required to produce approved color sample.
      d. Hydrated Lime: ASTM C207, Type S.
   2. Sand: ASTM C144.
   3. Water: Suitable for drinking, clean, and free of harmful amounts of acid, alkalis, salts, or organic materials.
   4. Admixtures:
      a. When required use only non-chloride based accelerators as approved by specifier
      b. No antifreeze substances shall be added to the mortar.
      c. Waterproofing admixture acceptable to masonry manufacturer. Dry-Block as manufactured by W.R. Grace or approved substitution.
   5. Pigments for colored mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C 979.
      a. Use of pigments shall not exceed 5% of the weight of masonry cement or 10% of the weight of Portland cement in the mortar.

C. Grout Materials
   1. Portland Cement: ASTM C150, Type I.
   2. Hydrated Lime: ASTM C207, Type S.
   3. Aggregates: ASTM C404
   4. Water: Suitable for drinking, clean, and free of harmful amounts of acid, alkalis, salts, or organic materials.

D. Mortar Mixes
   1. Mortar: ASTM C270, Type N in conformance with proportion specifications.

E. Grout Mixes
   1. Grout: ASTM C476, grout having 3,000 psi strength at 28 days for all reinforced masonry lintels, bond beams, and walls as indicated. See structural drawings for reinforced walls.

F. Water: Clean and potable

2.05 MISCELLANEOUS MATERIALS

A. Reinforcing steel: Reinforcing steel shall conform to ASTM A615, Grade 60. Refer also to specification Section 03 20.00 - Concrete Reinforcing. All manufactured steel is to be made in the USA.

B. Wire Reinforcement: At Solid Multiple Wythe Masonry Walls and Single Wythe Masonry Walls (Interior partitions): use #9 gauge truss type reinforcing. Pre-fab corners and tees shall be used at all wall corners and intersections; width shall be two (2) inches less than nominal thickness of walls.

C. Control Joints:
1. Exterior Wall Joints: Extruded rubber similar to Hohmann and Barnard, Inc. RS Series, of applicable design to receive sealant to seal joints.
2. Interior Wall Joints: Employ closed cell rubber strip of 1" less than thickness of wall. Secure with thin bed of adhesive to masonry as wall is laid. Finish with a thick layer of paintable sealant. Paint wall joint same color as wall.
3. Sealant shall be as specified in Section 07 90 00.
4. Exterior building expansion joints shall be as specified in Section 07 95 13.

2.06 MASONRY CLEANING SOLUTIONS

A. All exterior and interior exposed finished masonry and stonework shall be cleaned based on the cleaning material schedule below.

B. Water: Clean, potable, and free of oils, acids, alkalis, salts, and organic matter. Use to rinse masonry surfaces and dilute concentrated cleaners.

C. Clean with detergent mix only, no power wash. No attic stock is required.

D. Cleaning materials and equipment
1. Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
2. Brushes: Fiber bristle only.
3. Cleaning Products
4. "TexClean"; AHI Supply.
5. "Sertec"; Sermac, a Division of Service Master Industries, Inc.
6. "Sure Klean Restoration Cleaner," Prosoco, Inc.

E. The following products based on AHI Supply TexClean products are intended as a guide only and does not preclude the contractors use of equal products by listed manufacturers. Consult manufacturer prior to application for any questions or inconsistencies.

Substrate	Color/Type	Cleaning Solution
Brick	Red	Tex Clean Masonry Cleaner
	Light	Tex Tral Masonry Cleaner
	Dark	Tex Tral Masonry Cleaner
	Pavers	Tex Clean Masonry Cleaner
	Glazed	Tex Tral Masonry Cleaner
CMU	Split Face	Tex Tral Masonry Cleaner
	Burnished/Ground Face	Tex Tral Masonry Cleaner
Architectural Concrete	Natural Color/Smooth	Tex Tral Masonry Cleaner
	Textured	Tex Clean Masonry Cleaner
Stone Construction	Cast Stone	Tex Tral Masonry Cleaner
	Arriscraft	Tex Tral Masonry Cleaner
	Limestone (Unpolished)	Tex Tral Masonry Cleaner

2.07 MASONRY SEALER, WATER REPELLENT AND GRAFFITI CONTROL MATERIALS

A. All exterior and interior exposed finished masonry and stonework shall be sealed based on the water repellent schedule below. All exterior and interior masonry shall be sealed full height of applied wall.

B. Masonry Sealer, Water Repellent and Graffiti Control: Products manufactured by ProSoCo, Inc., Lawrence, KS, (800) 155-4255, or Architect or Owner approved equal. Verify product use based on masonry color being cleaned as instructed by manufacturer.

C. Provide five (5) year written warranty for performance of product and application.

D. Use water repellent admixtures for masonry units, mortar and grout by a single manufacturer.

E. The following products based on ProSoCo products are intended as a guide only and does not preclude the contractors use of equal products by listed manufacturers (provided an approved substitution request has been obtained). Consult manufacturer prior to application for any questions or inconsistencies.

Substrate	Type	Water Repellent
Brick	Clay (Exterior)	Weather Seal Siloxane PD
CMU	Split Face	Weather Seal Blok-Guard & Graffiti Control
	Interior Integral Color	Sure Klean® Burnished Block Sealer
Stone Construction	Natural Stone	Weather Seal Natural Stone Treatment WB
	Manufactured Stone	Weather Seal Siloxane PD
Burnished Block	Exterior	Weather Seal Blok-Guard & Graffiti Control
	Interior	Sure Klean® Burnished Block Sealer

PART 3 – EXECUTION

3.01 FORMS AND SHORES

A. Provide forms and shores sufficiently strong and rigid as required to support soffits, beams, and lintels during construction.

B. Build forms to conform to shape, line, and dimension of masonry members as detailed, substantial and sufficiently tight to prevent leakage of mortar, grout or concrete. Properly brace or tie together so as to maintain position and shape.

3.02 PREPARATION OF MATERIALS

A. Brickwork: Dampen brick before laying in a manner consistent with the nature of the brick, the mortar, and the weather conditions.

B. Mortar Mixing:
1. Measure sand by volume or equivalent weight using suitable containers for material measurement. Measuring sand by the shovel is not acceptable.
2. In a clean mortar mixer, thoroughly mix ingredients for a minimum of five (5) minutes with maximum amount of water to produce proper workability.
3. Retemper mortar as needed within 2 1/2 hours after initial mixing.
4. Discard unused mortar 2 1/2 hours after initial mixing.
5. Mortar shall not be used if curing has progressed to yield a stiff consistency.

C. Grout Mixing:
1. Control batching procedure to ensure proper volume proportions of grout materials and achieve grout slump between 8 and 11 inches.
2. Mix grout in accordance with ASTM C94.
3. Consistency shall completely fill all spaces intended to receive grout.
4. Grout shall not be used if curing has progressed to yield a stiff consistency.
5. Measure grout materials mixed at job site by volume or equivalent weight using suitable containers for material measurement.
6. In clean a mechanical mixer, thoroughly mix ingredients for a minimum of five (5) minutes.

D. Mortar and Grout Testing:
1. Test mortar and grout in accordance with Section 01 45 29.
2. Testing of Mortar: In accordance with ASTM C270.
3. Testing of Grout: In accordance with ASTM C1019.

E. Reinforcement:
1. Reinforcement shall be free from loose rust and other coatings that would reduce the bond.
2. Cut accurately to length and bend by such methods as will prevent injury to the material.
3. Straighten out kinks or bends.

F. Flashing:
1. Locations: Install in exterior walls to divert moisture within walls to exterior surfaces.
2. For membrane flashing, install per specification Section 07 65 26 and as indicated within the Drawings.
3. For sheet metal flashing, install per specification Section 07 62 00 and as indicated within the Drawings.
4. Adjacent Work: Protect work by masking, covering, or other precautionary methods. Remove protection when no longer necessary.
5. Separate stainless steel flashing from dissimilar materials as required.
6. Protect membrane flashing from overexposure to direct sunlight.

3.03 PROCEDURE

A. Install mortar and grout in accordance with ACI 530.1/ASCE 6/TMS 602.

B. Mortar proportions (by volume): **Type "N"** (750 psi compressive strength)
1 part portland cement
1/2 part hydrated lime
3 1/2 to 4 1/2 parts sand

1. Mix mortars with minimum amount of water consistent with workability to provide maximum tensile bond strength with capacity of mortar.

2. Materials shall be accurately measured and shall be mixed in a power mixer for a period of not less than five (5) minutes after all materials have been placed in mixer. Materials must be consistently the same from same source throughout the job. Tools and mixing boxes must be kept clean and no mortar which is partially set shall be retempered for use.

3. If required, add mortar color to mortar mix as required to match architect selected sample. Use white Portland cement at light-face CMU.
4. Masonry contractor will be responsible to ensure mortar meets or exceeds applicable UL assembly requirements and shall notify Architect & Structural Engineer of any conflicts prior to commencement of work for any modifications required.

B. Lay exposed masonry in the bond pattern shown or, if not shown, lay as follows:
1. Coursing of Concrete Masonry Units:
a. Bond: Running (unless otherwise shown on the drawings).
b. Coursing: One unit and one mortar joint to equal 8 inches.
c. Mortar Joints: Concave (excluding exterior cavity wall side)
d. Cavity wall Mortar Joints: Flush with no irregularities exceeding ¼-inch.

2. Coursing of Brick Units:
   a. Bond: Running (unless otherwise shown on the drawings).
   b. Coursing: Three units and three mortar joints to equal 8 inches.
   c. Mortar Joints: Concave and Flush

3. Lay solid masonry units in full bed of mortar, with full head joints

4. Units shall be laid with a shove joint on full, evenly-spaced bed and head joints fully coated with mortar before laying.

5. Buttering corners of joints or excessive furrowing of mortar joints are not permitted. Remove excess mortar as work progresses.

6. Interlock intersections and external corners. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.

7. Perform job site cutting of masonry units with motor-driven saws to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges. Where possible, use full-size units without cutting.
   a. At all louver and/or window sill conditions, grind down outside edge of brick as required to provide positive drainage of subsill. Provide a minimum of 1/4-inch drop from face of window framing system and or louver frame, to the outside face of the brick veneer.

8. Install cut units with cut surfaces and edges concealed.

9. Select and arrange exposed units to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

10. Cut mortar fins protruding into cavity from back side of face brick as work progresses.

11. Isolate masonry from vertical structural framing members.

12. At full-height walls, leave a 1" space between top of masonry and floor or roof structure above. Brace masonry from structure with 16- gauge galvanized steel angles having 4" equal legs and 8" lengths mechanically anchored to the floor or roof structure and spaced not more than 4'-0" on center or as indicated on Structural Drawings.

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

C. All masonry walls shall be bonded at corners and anchored to connecting Work. Appropriate anchors are to be used for each condition, including but not limited to, CMU, structural framing, and sheathing over metal studs; minimum 3 anchors plus floor anchor at each jamb of door frames and windows.

D. Joints shall be of uniform width throughout. Horizontal joints shall be level and vertical joints shall align.

E. Horizontal and vertical joints shall be 3/8” wide. Strike uniformly with 1” diameter jointing tool to smooth, hard, dense concave finish and left without cracks between mortar and units.

Delay tooling joints until mortar has had time to initially set. Texture and finish of all joints shall be the same.

1. Tool both sides of masonry units
2. Tool all joints, whether exposed to view or not, except as follows:
   a. Walls receiving an applied resilient base shall have the joints of the first course of masonry tooled flush with face of masonry
   b. Walls receiving damproofing and/or waterproofing finish shall have the joints for the entire height of masonry tooled flush with face of masonry.
   c. Walls receiving tile finish shall have the joints struck flush for the full extent of area receiving the scheduled finish.
   d. Whenever scored CMU is used, do not grout score and tool grout with raked joint to match score to accentuate 8 x 8 pattern.

F. Provide masonry reinforcement as indicated by Item 3.07.

G. No wet concrete masonry units shall be laid; wet face brick 3 to 4 hours before laying.

H. Adequately brace all walls so that wind and other forces will not damage wall.

I. Over openings, provide CMU lintel block concrete filled with reinforcing as shown on plans (minimum two (2) #5 continuous steel reinforcing bars and extend minimum 8” each side of opening). Install steel lintels at locations as required. Provide continuous concrete filled steel reinforced bond beams; reinforcing shall not cross expansion joints.

J. Reinforce CMU walls with filled cells and rebar embedded in foundation as indicated in Structural drawings, Specifications, and details.

K. Provide weeps 8-inches from each end and at 24-inches on center in the base course, TOP COURSE and at ALL through-wall flashing of exterior wythe of all exterior walls including all lintels and sills. Install in accordance with manufacturers written instructions. Care shall be taken to keep openings free from blockage by construction debris, backfill, etc.

L. Provide continuous cavity wall drainage system at ALL thru wall flashing conditions, base of exterior walls, etc. to maintain airflow and drainage while suspending mortar at unequal heights. Install per manufacturer’s instructions.

3.04 EXPANSION AND/OR CONTROL JOINTS

A. Provide expansion joints and/or control joints in all interior and exterior masonry walls at locations as shown on drawings, or as specified below, 3/8” to 1/2” wide unless otherwise noted

1. In long, straight walls at 15’-0” o.c. max., or height of the wall, whichever is less
2. At all abrupt changes in wall thickness or height
3. At chases for pipes, fixtures, etc.
4. On each sides of wall openings (or lintels above openings)
5. At bond beam breaks
6. At abutment of walls and columns or pilasters
7. At wall intersections in main walls or partitions (including all locations where interior CMU walls frame into exterior/perimeter CMU walls)
8. At construction joints in foundations, roofs or floors

9. At return angles in "L," "T" or "U"-shaped structures
10. When brick or stone veneer is applied to block
11. Within 2 feet 8 inches of building corners
12. On each side of all exterior door and window heads
13. On one side of all interior door and window heads

B. Steel Lintels: Provide horizontal bond breaks at the end bearing to allow for thermal expansion and contraction and provide control joints on each side of the opening continuing to the top and bottom of the brick wythe

C. CMU Lintels: Provide control joints in alignment with the outside ends of the lintel continuing to the bed joint and then with horizontal bond breaks at the end bearing

D. At exterior walls, joints in CMU shall be located directly behind joints in brick.

E. All Control and/or Expansion joints shall be free of mortar.

F. Exterior control and expansion joints shall be weatherproofed at the exterior surface with sealant over backer rod to match masonry or stone color. Interior joints shall be filled with caulk over backer rod. At exterior expansion joints provide copper bellows expansion joint material at the back-up wall condition as per Drawings.

G. Veneer Construction: Provide horizontal pressure relieving joints beneath shelf angles as recommended by BIA Technical Note 28B current edition.

3.05 WORKMANSHIP

A. Exterior masonry shall be laid up to make walls absolutely watertight. Prior to start of any masonry work, contractor shall review all back-up surfaces to insure completeness of waterproofing job; membrane waterproofing shall be installed, joints taped and sealed, dampproofing complete, etc.

B. Full joints are mandatory, light furrow on bed only. Apply sufficient mortar on ends to fill end joints completely.

C. Lay masonry true, plumb, level and straight. Wide or narrow joints and out-of-square units will be rejected.

D. Build in all ancillary work, equipment, etc. in neat, workmanlike manner.

E. Build in thru-wall flashing and sheet metal work or accessories furnished by other divisions. All joints in flashing lapped at least 6” and sealed. Turn up sides of thru wall flashing at ends of run to create end dam. Provide positive slope toward weeps to avoid any ponding water on flashing.

F. See that proper provisions are made for all structural, mechanical and electrical; construct chases, recesses, openings, etc. Build in grounds, nailing boards, bolts, plates, etc. Set bucks, blocking and anchors. Set hollow metal frames with proper anchors; grout jambs full. Provide a minimum 2” clearance around all structural steel, columns, and beams. Provide appropriate size CMU furring blocks to accommodate this. Provide wall furr outs as required to conceal structural columns, mechanical, electrical, etc. Refer to structural drawings, architectural drawings, mechanical/electrical drawings, as-built conditions, etc. for locations of these items.

G. Full size, uncut units shall be used whenever possible.

H. Openings and cutouts shall be carefully cut, formed or otherwise made around built-in items. Exterior brick veneer shall be turned in at window/door jamb conditions, unless noted otherwise on the Drawings.

I. Any unit that is disturbed after mortar has stiffened shall be removed and re-laid with fresh mortar.

J. Unfinished work shall be stepped back for joining with new work.

K. Concrete masonry unit lintels shall be formed from units of the thickness of the wall or proper height, cut or uncut, with the bottom of the unit at rough opening height and the top of the next adjacent mortar joint but not less than 8” in height.

L. Face of masonry units, texture, color, finish shall be the same in the entire wall surface in which they are laid.

M. For all interior CMU walls (integral color, burnished and/or painted), all projecting 90° corners and wing walls shall be factory-prefinished manufactured integral 1” radius bullnose block (on-site field bullnosing by mechanical means will not be allowed). Walls completely wrapped by hollow metal doorframes do not need to be bullnosed.

N. Take precautions to prevent excess mortar from dropping into cavity. Open cavities of walls under construction shall be covered at day’s end.

O. If Work includes split face CMU, chip away uneven edges of CMU as necessary to install surface-mounted items flush with wall (i.e., cover plates, electrical cover plates, louvers, drinking fountains, fire alarm pulls, handrails, etc.).

P. Stain Prevention: As work progresses, prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

Q. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

3.06 JOINT REINFORCEMENT AND ANCHORAGE

A. Install horizontal joint reinforcement in CMU walls 16-inches on center vertically.

B. Place joint reinforcement in first and second horizontal joints above and below openings greater than 12 inches wide. Extend minimum 16 inches each side of opening.

C. Place joint reinforcement continuous in first and second joints below tops of walls. Lap joint reinforcement ends minimum 6 inches.

D. Cut or interrupt joint reinforcing at control and expansion joints.

E. At corners, install horizontal joint reinforcement with prefabricated 'L" intersections.

F. At intersecting and abutting walls, unless vertical expansion or control joints are shown at juncture, install horizontal joint reinforcement with prefabricated "T" intersections.

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

H. Install anchors attached to concrete and steel structural members:
1. Leave an open space not less than 1 inch in width between back of masonry and face of structural member. Keep open space free of mortar or other rigid materials.
2. Install anchors at maximum 16 inches o.c. vertically and horizontally.

I. Masonry Flashings: Refer to Section 07 65 26 – Membrane Flashing and Section 07 62 00 – Sheet Metal Work.
1. Provide concealed flashing in masonry work at or above shelf angles, lintels, ledges and other obstructions to the downward flow of water in the wall so as to divert such water to the exterior.
2. Prepare masonry surfaces smooth and free from projections which could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with mastic before covering with mortar.
3. Extend metal flashings horizontally through exterior face of masonry and turn down 1/4 inch to form drip. Membrane flashings shall not extend beyond the face of the masonry.
4. Turn flashing up minimum 16 inches and seal to backup wall with termination bar. Cover termination bar and all anchors with liquid membrane.
5. Lap end joints minimum 6 inches and seal watertight.
6. Extend full length of lintels and shelf angles and minimum of 8-inches into masonry beyond openings on each end; turn up ends not less than 2" to form end dams.
7. Turn flashing, fold, and seal at corners, bends, and interruptions.

K. Lintels:
1. Install galvanized loose steel lintels over openings more than 12 inches wide in brick walls.
2. Install reinforced unit masonry lintels over openings more than 24 inches wide in CMU walls.
   a. Reinforce lintels as indicated on Drawings; coordinate with Structural drawings.
   b. Do not splice reinforcing bars.
   c. Support and secure reinforcing bars from displacement.
   d. Place and consolidate grout fill without displacing reinforcing.
   e. Allow masonry lintels to attain specified strength before removing temporary supports.
3. Maintain minimum 8 inch bearing on each side of opening.

L. Grouted Components:
1. Reinforce bond beams and pilasters as indicated on Drawings; coordinate with Structural drawings.
2. Splice reinforcement in accordance with Section 03 21 00.
3. Support and secure reinforcing bars from displacement.
4. Place and consolidate grout fill without displacing reinforcing.
5. At bearing locations, fill masonry cores with grout for minimum 12 inches both sides of opening.

6. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

M. Reinforced Masonry:
1. Lay masonry units with core cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
2. Place reinforcement bars as indicated on Drawings.
3. Splice reinforcement in accordance with Section 03 21 00.
4. Support and secure reinforcement from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. Place grout in accordance with ACI 530.1 Specification for Masonry Structures.

N. Control and Expansion Joints:
1. Install control and expansion joints at the maximum spacing described above, and/or as otherwise indicated on Drawings
2. Do not continue horizontal joint reinforcement through control or expansion joints.
3. Form control joint with sheet building paper bond breaker fitted to one side of hollow contour end of block unit. Fill resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
4. Form expansion joint by omitting mortar and cutting unit to form open joint.

O. Built-In Work:

1. As work progresses, install built-in door and window frames, wood nailing strips, anchor bolts, plates, and other items to be built-in the work and furnished by other sections.

2. Install built-in items plumb and level.

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

4. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

5. Do not build in materials subject to deterioration.

P. Cutting and Fitting:
1. Cut and fit for chases, pipes, conduit, sleeves, grounds, and other items penetrating masonry. Coordinate with other sections of work to provide correct size, shape, and location. At any cut openings in masonry walls, refer to Structural Drawings for lintel requirements.

2. Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3. At all louver and/or window sill conditions, grind down outside edge of brick as required to provide positive drainage of subsill. Provide a minimum of 1/4-inch drop from face of window framing system and or louver frame, to the outside face of the brick veneer.

3.07 ERECTION TOLERANCES

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

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

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

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

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

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft with a maximum joint thickness of 1/2 inch.

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

H. Maximum Variation for Steel Reinforcement:
1. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.
2. Plus or minus 1/2" inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
3. Plus or minus 1 inch when distance is between 8 and 24 inches.
4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
5. Plus or minus 2 inches from location along face of wall.

3.08 POINTING AND CLEANING

A. Wipe masonry with rough cloth as work progresses to remove loose mortar and prevent stains.

B. Upon completion of work, all holes shall be filled (except weep holes) with fresh mortar and tooled. Cut out defective joints and repoint.

C. After pointing has set and hardened, all exposed surface masonry shall be thoroughly cleaned with stiff fiber brushes and clear water. Do not use acid. Other products such as Prosoco or Sure-Klean may be used if approved, in writing, prior to start of masonry work by masonry manufacturer, mortar material manufacturers, and mason that product used will not affect, harm in any way, cause streaks, discoloration, deterioration of brick / mortar, etc.

D. All exposed masonry shall be left clean and free from mortar daubs and other stains and with watertight joints throughout.

E. At conclusion of work of this Section and as directed by the General Contractor, remove scaffolding and equipment used, clean up debris, refuse, and surplus materials and remove them from project site.

F. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid

strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.

2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.

3. Neutralize alkaline and acid wastes before disposal.

4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

G. Repair any cracks that appear in masonry by removal of full masonry unit back to next mortar joint.

H. Provide adequate temporary lighting to allow for proper installation of all masonry work.

3.09 FIELD QUALITY CONTROL

A. Field testing will be performed under the provisions of Section 01 45 29.

B. Testing of Mortar: In accordance with ASTM C780 for consistency, mortar aggregate ratio, water content, air content, and compressive strength.

C. Testing of Grout: In accordance with ASTM C1019.

3.10 INSPECTION

A. The architect may from time to time require the mason to remove several masonry units to review quality of joints.
1. If mortar joints do not meet the specifications, additional units shall be removed until satisfactory joints or beds are encountered, plus at least three (3) additional units for verification
2. Removal and replacement of units shall be done within the scope of work of this section without additional cost.

3.11 DEFECTIVE CONSTRUCTION

A. Correct defects appearing in the finished work for a period of two years after the date of Substantial Completion.

B. Defects shall include, but not be limited to, cracking, separating or color leaching of mortar, cracking, discoloration, or deterioration of masonry units, efflorescence in masonry units or joints, and water penetration through face brick or joints under normal exposure.

3.12 PROTECTION OF FINISHED WORK

A. Protect exposed external corners subject to damage. Protect base of walls from mud and mortar splatter.

B. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.

C. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide waterproof coverings where in-progress masonry work is exposed to weather.

END OF SECTION 04 20 00

SECTION 04 72 00 CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are indicated on drawings as "cast stone".

1.02 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2024.

D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.

E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

F. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

G. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

J. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023, with Editorial Revision (2024).

1.03 SUBMITTALS

A. Product Data: Test results of cast stone components made previously by the manufacturer.

B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

C. Mortar Color Selection Samples.

D. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.

E. Source Quality Control Test Reports.

F. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
   2. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

1.05 MOCK-UPS

A. Provide full size cast stone components for installation in mock-up of exterior wall.

B. Approved mock-up will become standard for appearance and workmanship.

C. Mock-up may remain as part of the completed work.

D. Remove mock-up not incorporated into the work and dispose of debris.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Architectural Cast Stone:
   1. Any current producer member of the Architectural Precast Association.

2.02 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural stone, complying with ASTM C1364.
   1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet (6 meters).
   4. Color: Selected by Architect from manufacturer's full range.
   5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
   1. Pieces More than 24 inches (610 mm) in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Admixtures: ASTM C494/C494M.

E. Water: Potable.

F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

I. Mortar: Portland cement-lime, as specified in Section 040511 ; do not use masonry cement.

J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04 20 00.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
   1. Rake mortar joints 3/4 inch (19 mm) for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch (9.5 mm) thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.
      f. Joints labeled "expansion joint".

B. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet (3 m).

B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.

C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

A. Keep cast stone components clean as work progresses.

3.06 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

SECTION 05 12 00 STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of structural steel work is shown on drawings including schedules, notes and details that show size and location of members, typical connections, and type of steel required. Furnish all labor, materials, services, equipment and appliances required in conjunction with or related to the furnishing, fabrication, delivery, and erection of all structural steel defined below. Include all supplementary parts, members and connections necessary to complete the structural steel work, regardless of whether all such items are specifically shown or specified on the drawings.

B. Structural steel shall be defined as that work prescribed in Section 2.1 of the AISC "Code of Standard Practice for Steel Buildings and Bridges" and all steel supports for elevator guide rails and catwalks (including support members and attached structural steel shapes and plates such as hangers and toeplates).

C. Miscellaneous metal fabrications, architecturally exposed structural steel, metal stairs and ladders, steel joists, cold-formed metal framing, and steel deck are specified elsewhere in these Specifications.

1.3 QUALIFICATIONS

A. Fabricator:

1. The structural steel fabricator shall have not less than 5 years of experience in the successful fabrication of structural steel similar to this project.
2. The structural steel fabricator must be registered and approved by the local building official to perform fabrication work without special inspection. Should the fabricator not be so approved, the fabricator shall reimburse the Owner for the cost of the special inspections required by the local building official.

B. Detailer:

1. The structural steel detailer shall have not less than 5 years of experience in the successful detailing of structural steel similar to this project including experience in selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual.

C. Erector:

1. The structural steel erector shall have not less than 5 years of successful experience in the erection of structural steel of a similar nature to this project.
2. The structural steel erector must participate in the AISC Erector Certification Program and be designated an AISC Certified Steel Erector.

D. Professional Engineer: A professional engineer who is licensed to practice engineering in the state where the project is located 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,

1. The Professional Engineer employed by the Fabricator for connection design shall be experienced in the specific area of structural steel connection design with demonstrated experience of not less than three projects of similar scope and complexity.

2. The Professional Engineer employed by the Erector for preparation of Erection Bracing Drawings shall be experienced in the specific area of structural frame bracing during erection design with demonstrated experience of not less than three projects of similar scope and complexity

E. Independent Testing Laboratory: Any testing laboratory retained to perform tests that are required by this specification shall meet the basic requirements of ASTM E 329.

1.4 QUALITY ASSURANCE

A. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

B. Codes and Standards: Comply with provisions of following, except as otherwise indicated. For codes and standards for which no specific version is referenced, the version that is referenced in the applicable building code shall govern, or, if there is no reference in the building code, the latest version of the code or standard shall govern except as otherwise noted in the AISC Steel Construction Manual, 13th edition. Certain sections in this specification contain requirements that are more restrictive and/or different than contained in the standards listed. In such cases, the requirements of this specification shall control.

1. All federal (OSHA), state and local laws that govern safety requirements for steel erection and other requirements if more stringent than the codes and standards enumerated below. OSHA requirements include regulation 29 CFR 1926, Part R, "Safety Standard for Steel Erection".
2. AISC, "Code of Standard Practice for Steel Buildings and Bridges," except as noted herein.
   a. Certain sections in this specification contain requirements that are more restrictive and/or different than contained in this standard. In such cases, the requirements of this specification shall control.
3. ANSI/AISC 360, "Specification for Structural Steel Buildings."
4. Research Council on Structural Connections (RCSC) "Specification for Structural Joints using High-Strength Bolts."
5. AISC, "Steel Construction Manual", Thirteenth Edition.
6. ANSI/AWS D1.1, "Structural Welding Code – Steel."
7. ANSI/AWS D1.3, "Structural Welding Code – Sheet Steel."
8. ANSI/AWS D1.4, "Structural Welding Code – Reinforcing Steel."
9. The Society of Protective Coatings, "SSPC Painting Manual", Volumes 1 and 2.

C. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code - Steel".

D. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in the mill, shop, and field by the Owner's testing laboratory. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. The Contractor shall promptly remove and replace materials or fabricated components which do not comply.

E. Questions about Contract Documents: The Contractor shall promptly notify the Architect/Engineer whenever design of members and connections for any portion of the structure are not clearly indicated or when other questions exist about the Contract Documents. Such questions shall be resolved prior to the submission of shop drawings.

F. Owner's Testing Laboratory Services: Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents

G. Surveyor: The General Contractor shall employ a qualified land surveyor to perform surveys required by this specification.

1.5 SUBMITTALS

A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products; include laboratory test reports and other data to show compliance with specifications (including the specified standards):

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties. For structural steel for which evidence exists that the steel may not conform to ASTM requirements, the contractor, where permitted by the engineer, shall engage the services of an independent testing laboratory to test the material according to ASTM A 6 and submit certified test reports that verify conformity to ASTM standards. Tests shall be made for each 10 tons of affected material unless otherwise directed by the Engineer.
2. High-strength bolts (each type), including nuts and washers, including certified copies of mill reports covering physical and chemical properties.
3. Shrinkage-resistant grout.
4. Welding electrodes (each type).
5. Structural steel primer paint.
6. Inorganic or other protective paint.
7. Shear studs.
8. Direct tension indicators.

B. Shop Drawing and Erection Drawings:

1. Definitions:
   a. Shop Drawings: Drawings of the individual structural steel shipping pieces that are to be produced in the fabrication shop.
   b. Erection Drawings: Field-installation or member-placement drawings that are prepared by the Fabricator to show the location and attachment of the individual shipping pieces.
   c. Erection-Bracing Drawings: Drawings that are prepared by the Erector to illustrate the sequence of erection, any requirements for temporary supports and the requirements for raising, bolting, and/or welding. These drawings are in addition to and separate from the Erection Drawings.
2. Shop Drawings: Submit for review and approval shop drawings showing complete details and schedules for fabrication and assembly of structural steel members. The licensed professional engineer responsible for the design of any of the connections shown on the shop drawings shall submit a letter that is sealed attesting that the connection design engineer has reviewed the shop drawings and that the connections detailed and shown on the shop drawings conform to the engineer's design.
3. Structural steel shop drawings shall include the following minimum information:

a. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify the type of high-strength bolted connection (slip-critical, direct-tension, or bearing connections). Holes, flange cuts, slots and openings shall be made as required by the structural drawings, all of which shall be properly located by means of templates.
b. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

4. Erection Drawings: Submit for review and approval complete erection drawings showing field-installation and member-placing instructions for locating and attaching the individual shipping pieces.
5. Preliminary Connection Review with Steel Fabricator: The fabricator shall submit for review and approval preliminary details of proposed connections for Engineer's review

not less than 14 days in advance of the start of preparation of detailed shop drawings. Proposed variations from the details shown on the drawings will be considered and such variations must have preliminary approval from the Engineer prior to the preparation of detailed shop drawings. Failure to adhere to the requirements of this section obligates the Contractor to take responsibility for any and all resulting delays in the detailing and fabrication of structural steel.

6. The fabricator alone shall be responsible for all errors of detailing, fabrication, and for the correct fitting of the structural members.
7. All fabricated material and connections shall fit within architectural constraints.
8. Structural steel members for which shop drawings have not been reviewed and approved shall not be fabricated.
9. The omission from the shop drawings of any materials required by the Contract Documents shall not relieve the Contractor of the responsibility of furnishing and installing such materials, even though the shop drawings may have been reviewed and approved.
10. Shear Connector Placement Drawing: Provide shop drawing showing proper placement (longitudinal and transverse spacing) of shear connectors on each composite beam requiring such connectors. The shop drawing shall show the proper relationship of the shear connectors to the flutes in the steel deck and the arrangement of shear connectors along the span of the composite beam. Show the method of attachment of shear connectors and proposed brand and model of equipment to be used.

C. Surveys: Submit the information requested for all surveys required by this specification.

D. Test Reports: Submit certified reports of tests required by this Specification Section. Include data on type(s) of tests conducted and test results.

E. Qualification Data:
1. Submit qualification data, including required certifications, for firms and persons specified in the "Qualifications" section under Part 1, to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
2. Submit a resume from the structural steel detailer showing a minimum of two years of experience selecting or completing structural steel connection details using information found in tables in the AISC "Steel Construction Manual".
3. Submit Welding Procedure Specifications (WPS) in accordance with ANSI/AWS D1.1 for all welded joints. Submit test reports showing successful passage of qualification tests for all non-prequalified WPSs.
4. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests as specified in the "Qualifications" section under Part 1. If recertification of welders is required, retesting will be at Contractor's responsibility.
5. A fabricator that is registered with the local building official and is approved to perform fabrication without special inspection shall submit a certificate of compliance stating that the work was performed in accordance with the approved construction documents.

F. Substitutions:
1. Substitutions for the member sizes, type(s) of steel connection details or any other modifications proposed by the Contractor will be considered by the Architect/Engineer only under the following conditions:
   a. That the request has been made and accepted prior to the submission of shop drawings. All substitutions shall be clearly marked and indicated on the shop drawings as a substitute.

b. That there is a substantial cost advantage or time advantage to the Owner; or that the proposed revision is necessary to obtain the required materials or methods at the proper times to accomplish the work in the time scheduled.
c. That sufficient sketches, engineering calculations, and other data have been submitted to facilitate checking by the Architect/Engineer, including cost reductions or savings in time to complete the work.
d. In no case shall such revisions result in additional cost to the Owner.

1.6 PRE-CONSTRUCTION CONFERENCE

A. At least 14 days prior to beginning structural steel erection, the Contractor shall hold a meeting to review the detailed quality control and construction requirements and to determine the procedures for producing proper structural steel construction. Also review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for materials inspection, testing and certifications.

B. The Contractor shall require responsible representatives of every party who is concerned with the structural steel work to attend the conference, including but not limited to the following:
1. Contractor's Superintendent.
2. Laboratory responsible for field quality control.
3. Special Inspector / Laboratory responsible for shop inspection or testing.
4. Structural Steel Detailer.
5. Structural Steel Fabricator.
6. Structural Steel Erector.
7. Owner's and Architect's/Engineer's Representative.

C. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:
1. Owner's Representative.
2. Architect.
3. Engineer-of-Record.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor rods and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time so as not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. Do not store materials on structure in a manner that might exceed allowable loads on or cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed by Architect/Engineer.

D. Furnish all fuel, maintenance, and equipment required for hoisting and placement of materials under this contract.

E. Process, pay for and maintain all permits and certificates of on-site inspection required for derricks, cranes and hoisting equipment. No derrick, crane or hoisting equipment shall be operated without a certificate of operation and a certificate of on-site inspection, as required by governing authorities.

1. In addition to the above, all hoisting equipment shall be installed, operated and maintained in accordance with all applicable regulations of authorities having jurisdiction.
2. The Contractor shall furnish street storage and sidewalk crossing permits.

1.8 JOB CONDITIONS

A. The Contractor shall coordinate the fabrication and erection of all structural steel work with the work of other trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural Steel: All hot rolled steel plates, shapes, sheet piling, and bars shall be new steel conforming to ASTM A 6.

B. Structural steel shall comply with the provisions of the following ASTM Specifications as appropriate for the grades and types, and at the locations as specified on the drawings:
1. Structural Steel Wide Flange and WT Shapes: High Strength Steel, ASTM A 992. ASTM A 572, Grade 50 is acceptable as a substitute for A992.
2. M-Shapes, S-Shapes, and Channels: Carbon Steel, ASTM A 36.
3. Angle Shapes: Carbon Steel, ASTM A 36.
4. Structural Steel Plates and Bars: Carbon Steel, ASTM A 36.
5. Structural Steel Plates and Bars: High Strength Steel, ASTM A 572, Grade 50.
6. Steel Pipe: ASTM A 53 (Type E or S) Grade B (Fy = 35 ksi).
7. Round HSS: ASTM A 500, Grade C (Fy = 46 ksi).
8. Square and Rectangular HSS: ASTM A 500, Grade B (Fy = 46 ksi).
9. Connection Material: Unless noted otherwise on the drawings, column stiffener plates and doubler plates at moment connections shall be the same grade of steel as the beam connecting the column (highest grade if more than one grade is used). All other connection material except as noted otherwise on the drawings including bearing plates, gusset plates, stiffener plates, filler plates, angles, etc. shall be A36 steel unless a higher or matching grade of steel with the members connected is required by strength or stiffness calculations and provided the resulting sizes are compatible with the members connected.

C. Structural Steel Surfaces: For fabrication of work which will be exposed to view in the completed structure, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

D. Structural Bolts and Threaded Fasteners: Structural bolts and threaded fasteners shall comply with the following ASTM Specifications as appropriate for the types and at the locations as specified on the drawings:
1. ASTM A 325 Type 1.
2. Alternative Design Fasteners: Fasteners that incorporate a design feature intended to indicate a predetermined tension or torque (load indicator bolts or "twist-off" bolts) shall conform to the requirements of section 2.8 of the RCSC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".
   a. Bolts that are manufactured to conform to ASTM A 325 shall additionally conform to ASTM F 1852.
   b. Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:
      1) Nucor Fastener, A Division of Nucor Corporation.

2) Lake Erie Screw Corp.
3) Vermont Fasteners Manufacturing.
4) Lohr Structural Fasteners.

3. Threaded Round Stock:
   a. ASTM A 36.
   b. ASTM A 572 Grade 50 (to 2 inches in diameter).
4. Bolts and Nuts, High Strength Bolts: Bolts and nuts for all high strength bolts shall be heavy hex head conforming to ANSI Standards B18.2.1 and B18.2.2 respectively. Nuts shall conform to ASTM A 563.
5. Washers: All washers shall be circular, flat and smooth and shall conform to the requirements of Type A washers in ANSI Standard B23.1. Washers for high strength bolts shall be hardened and conform to ASTM F 436. Beveled washers for American Standard Beams and channels shall be square or rectangular, shall taper in thickness (16 2/3% slope) with an average thickness of 5/16". When an outer face of a bolted part has a slope greater than 1:20 with respect to a plane normal to the bolt axis, a beveled washer shall be used. Washers to be used with A490 bolts larger than 1 inch in diameter and installed over oversized or short-slotted holes and other similar situations shall conform to ASTM F 436 except with 5/16 inch minimum thickness.
6. Zinc-Coated Bolts: ASTM A 325 bolts, with their nuts and washers, that are used to connect steel called for on the drawings or in the specifications as hot-dip galvanized after fabrication shall be zinc-coated either by the hot-dip process in accordance with ASTM A 153, Class C or by the mechanical deposition process in accordance with ASTM B 695, Class 50, Type 1. The bolts, nuts, and washers shall all be zinc-coated using the same process and they shall be considered together as an assembly and shall be tested and shipped together as such. Comply with all the requirements of ASTM A 325 and ASTM A 563 as they relate to zinc-coated materials. ASTM F 1852 bolts with their nuts, and washers shall be zinc-coated only by the mechanical deposition process in accordance with ASTM B 695, Class 50, Type 1. Do not zinc-coat ASTM A 490 bolts.
7. Direct Tension Indicators: Compressible washer-type direct-tension indicators conforming to ASTM F 959.
   a. Subject to conformance with specified requirements, acceptable manufacturers include but are not limited to:
      1) Applied Bolting Technology.
      2) Turnasure, LLC.
8. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed.
9. New Bolts: All bolts shall be new and shall not be reused.

E. Electrodes for Welding:
1. Provide electrodes that comply with AWS D1.1, "Structural Welding Code - Steel" and that can produce welds that have a minimum Charpy V-notch toughness of 20 ft-lbs at 40° F, unless noted otherwise in these specifications or on the drawings.
2. Electrodes for various welding processes shall be as specified below:
   a. SMAW:
      1) E70XX low hydrogen
   b. SAW:
      1) F7X-EXXX
   c. GMAW:
      1) ER70S-X
   d. FCAW:
      1) E7XT-X
3. Electrodes shall be compatible with parent metal joined.

F. Headed Studs used as Anchors for Structural Steel Members into Concrete: AWS Type A studs manufactured in conformance with ASTM A 108 with a minimum tensile strength of 61,000 psi of sizes as specified on the drawings.

G. Headed Studs used as Shear Connectors: AWS type B studs manufactured in conformance with ASTM A 108 with a minimum tensile strength of 65,000 psi of sizes as specified on the drawings.

H. Deformed Bar Anchors: AWS Type C studs manufactured in conformance with ASTM A 496 with a minimum tensile strength of 80,000 PSI. ASTM A 615 reinforcing bars may not be substituted for deformed bar anchors.

I. Anchor Rods:
1. All anchor rods shall conform to ASTM F 1554. unless noted otherwise on the drawings and shall be of the yield strength as specified below as appropriate for the types and at the locations as specified on the drawings:
   a. Grade 55 (1/4 inch to 4 inches in diameter). Also comply with Supplementary Requirement S1 of ASTM F 1554.
2. Anchor rods used with galvanized baseplates shall be galvanized.
3. Nuts: All nuts with anchor rods shall be heavy hex head conforming to ASTM A 563.
4. Washers: Unless indicated otherwise, washers for all base plates shall be in accordance with the AISC "Steel Construction Manual", Table 14-2 with holes 1/16" larger than the anchor rod diameter. Washers shall conform to ASTM A 36 steel.

J. Structural Steel Primer Paint:
1. Primer paint shall produce a class B coating on all painted faying surfaces that are a part of a slip-critical connection as noted on the drawings; surface prepared according to SSPC-SP-6 (Commercial Blast Cleaning) and shall be of the following types.
   a. Organic zinc-rich primer utilizing either an epoxy or urethane binder with a minimum volume solids ratio of 50 percent with a minimum zinc content of 80 percent by weight in the dry film. Apply primer at a rate to achieve a dry film thickness of 3.0 to 4.0 mils. The primer shall comply with the AISC Class B slip critical requirement. (SSPC-SP6 Commercial Blast Cleaning).
2. Except for locations requiring a slip critical coating, use primer paint with the indicated surface preparation:
   a. SSPC-Paint 25.1, Type II; zinc oxide, raw linseed oil and alkyd primer, surface prepared according to SSPC-SP-2 (Hand Tool Cleaning) unless noted otherwise in this specification.
3. Refer to Architect's drawings and specifications for final paint finish requirements of structural steel. Primer paint shall be compatible with final paint requirements.

K. Non-Shrink Grout: Provide grout type(s) as specified on the drawings:
1. Non-Metallic Non-Shrink Grout: Premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents, and fluidity improving compounds. Conform to ASTM C 1107. Provide the minimum strength as shown below as determined by grout cube test at 28 days:
   a. 6,000 PSI for supporting concrete 3000 psi and less.
   b. 8,000 PSI for supporting concrete greater than 3000 psi and less than or equal to 4000 psi.
   c. Unless noted otherwise on the drawings, grout strength on supporting concrete greater than 4000 psi shall be 8000 psi.
2. Subject to conformance with specified requirements, acceptable non-shrink grouts include:
   a. L&M Construction Chemicals, Inc.; Crystex and Duragrout.

b. Dayton-Superior Corporation; Sure Grip High Performance Grout and 1107 Advantage Grout.
c. BASF Construction Chemicals; Masterflow 555, and Set Grout.
d. U.S. Grout Corp.; Five Star Grout.
e. The Euclid Chemical Company; NS Grout.
f. Hilti, Inc.; CG 200 PC.

L. Grating: Welded steel bar grating of the type, depth and finish noted on the drawings capable of carrying not less than the stated live load and deflecting not more than span/360 under that load.

M. Hot Dip Galvanizing:
1. Scope: All structural steel items and their connections permanently exposed to exterior conditions or that are within areas of unconditioned airspace, whether specified on the drawings or not, shall be hot-dipped galvanized after fabrication unless indicated on the drawings or in Specification Section 09900 to receive a primer and/or finish coat. Such items include, but are not limited to:
a. Base plates and anchor rods supporting galvanized members shall also be galvanized.
b. Shelf angles.
c. Parapet wall supporting members.
d. Screen wall supporting members.
e. Window washing support members.
f. Embedded plates in concrete exposed to unconditioned airspace.
g. Garage guardrail steel and connections.
h. Cooling tower support steel.
i. Building skin support steel exposed to moisture outside the exterior waterproofing surface.
j. Examine the architectural and structural drawings for other items required to be hot dipped galvanized.
2. Zinc-coat all ASTM A 325 bolts nuts, and washers used in the connection of such steel. Field welded connections shall have welds protected and the exposed portions of ASTM A 490 bolts, nuts and washers shall be protected with galvanizing repair paint.
3. Surface Preparation: All steel to be hot dip galvanized shall undergo the following surface preparation as specified by the Steel Structures Painting Council (SSPC), Volume 2.
a. Remove all grease, oil, grime and foreign contaminants by thorough cleaning with an alkaline or organic solvent followed by thorough rinsing in cold water.
b. Remove scale by pickling in diluted sulfuric or hydrochloric acid. Pickling shall be followed by a rinse in warm water and a second rinse in cold water. As an alternative to pickling, the steel may be white metal blast cleaned according to SSPC-SP-5.
c. Dip in a flux solution of zinc ammonia chloride followed by drying at room temperature.
4. Zinc Coating: The zinc coating for steel shapes and plates shall conform to ASTM A 123. Weight of zinc coating per square foot of surface for 1/8 inch and 3/16" thick steels shall average not less than 2.0 oz. with no individual thickness less than 1.8 oz. The coating weight shall average not less than 2.3 oz. with no individual thickness less than 2.0 oz. for 1/4" thick and heavier steel.

N. Galvanizing Repair Paint: Galvanizing repair paint shall be "ZRC Cold Galvanizing Compound" as manufactured by ZRC Chemical Products or a paint complying with SSPC-Paint 20.
1. An example of the following is ConServ Type CSA which is capable of supporting 2000 psi. It should be listed as the typical frictionless bearing pad.

2. An example of the following is Conserv Type CSB which is capable of supporting 4000 psi. It should be listed only in the event that higher forces are required.
3. sides by the amount of the expansion joint width shown on the drawings.

2.2 FABRICATION

A. Shop Fabrication and Assembly:
1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specification and as indicated on approved final shop drawings. Provide camber in structural members where indicated. Fabricator shall coordinate connection details, joint fit-up procedures, and field adjustment requirements with erector. The General Contractor shall coordinate provision of all erection bolts, lifting lugs or other devices required for erection with the fabricator and the erector and for interference with architectural finishes and constraints.
2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
3. Clearly mark the grade of steel on each piece, distinguishable in the field from floor surfaces, for purpose of field inspection and confirmation of grade of steel.
4. Milled surfaces of built-up sections shall be completely assembled or welded before milling.
5. Fitted stiffeners shall be fabricated neatly between flanges, and the ends of stiffeners shall be milled or ground to secure an even bearing against abutting surfaces. All milled or ground joints shall bear throughout their contact length.

B. Dimensional Tolerances: Dimensional tolerances of fabricated structural steel shall conform to Section 6.4 of the AISC Code of Standard Practice.

C. Camber:
1. Camber of structural steel members is indicated on the drawings. Camber shall be measured in the fabricators shop in the unstressed condition, prior to erection. The fabricator shall provide camber measurements of all beams and a report to the Testing Laboratory confirming this has been done.
2. Where possible, camber of beams shall be applied by a cold bend process.
3. The local application of heat may be used to introduce or correct camber, curvature, or straightness provided the temperature of the heated area, as measured by temperature crayons or other approved means, does not exceed 1200°F.
4. Where indicated on the drawings in a camber diagram, cantilever or double cantilever beams shall be cambered for the main span and cantilever end separately, either by a staged cold bending process or by the application of heat.
5. Beams detailed without specified camber shall be fabricated so that after erection any natural camber due to rolling or shop fabrication is upward.
6. Specified camber for beams shall be in accordance with the AISC "Code of Standard Practice".

D. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Engineer. Any member having a splice not shown and detailed on approved shop drawings will be rejected.

E. Compression Joints: Ends of columns, except as otherwise noted, and other compression joints at splices and other connections as noted on the drawings which depend on contact bearing as part of the splice strength shall be finished to bear in accordance with AISC Specification M2.6 so as to provide complete true bearing in accordance with AISC Specification M4.4.

F. Cutting: Manual oxygen cutting shall be done only with a mechanically guided torch. An unguided torch may be used provided the cut is not within 1/8 inch of the finished dimension and final removal is completed by means such as chipping or grinding to produce a smooth surface quality free of notches or jagged edges. All corners shall be smooth and rounded to a minimum 1/2" radius.

G. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members as shown on the contract documents, and/or the final shop drawings.
1. Provide specialty items as indicated to receive other work.
2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

H. Lifting and Erection Devices: The fabricator shall be responsible for designing, detailing and furnishing all lifting devices and erection aids required for erection. Such devices shall be removed after erection if they interfere with architectural finish requirements.

I. Drainage Holes: Provide 1 inch diameter drainage (weep) holes in all members (trusses, girders, beams, etc.) exposed to weather where rain water could collect (at low points and/or behind dams caused by connections, stiffener plates, etc.). Show all holes on shop drawings for review by the Engineer.

2.3 WELDING

A. Code: All shop and field welding shall conform to all requirements in the "Structural Welding Code - Steel", ANSI/AWS D1.1, as published by the American Welding Society (AWS).

B. Welder Certification: All shop and field welders shall be certified according to all the applicable AWS procedures for the welding process and welding position used. Each welder shall be assigned an identifying symbol or mark and all shop and field welded connections containing complete or partial joint penetration welds, multi-pass fillet welds, and fillet welds greater than 5/16" shall be identified by the symbol or mark of the welder responsible for the connection.

C. Minimum Size and Strength:
1. Fillet Welds: Minimum size of fillet welds shall be as specified in Table J2.4 in AISC Specification, Chapter J.
2. Partial-Penetration Groove Welds: The minimum effective throat thickness of partial-penetration groove welds shall be as specified in Table J2.1 in AISC Specification, Chapter J.
3. Minimum Strength of Welded Connections: Except as specified below in "Connections" or noted otherwise on the drawings, all shop and field welds shall develop the full tensile strength of the member or element joined. All members with moment connections as indicated on the drawings shall be welded to develop the full flexural capacity of the member, unless noted otherwise on the drawings.

D. Filler Metal Requirements: Weld metal shall be as specified in Table J2.5 in AISC Specification, Chapter J and other requirements of this specification.

E. Welding Procedure Specification:
1. All welding shall be performed in accordance with a Welding Procedure Specification (WPS) as required in AWS D1.1 and approved by the Owner's Testing Laboratory and the Architect/Engineer. The WPS variables shall be within the parameters established by the filler-metal manufacturer. Engage the services of an independent testing laboratory to provide the qualification testing required by AWS D 1.1, Chapter 4, part B to qualify any non-prequalified WPS needed for the project. The testing laboratory

shall prepare Welding Procedure Qualification Records (WPQR) documenting the successful qualification of each Welding Procedure Specification.

F. Welding Procedures:
1. All welding processes shall comply with the requirements of ANSI/AWS D1.1 unless noted otherwise.
2. Complete joint penetration welds of beam bottom flanges to column, or to continuity plates shall be sequenced to conform to the requirements of AWS D1.8, Section 6.14.
3. Built-up sections assembled by welding shall be free of warpage and all axes shall have true alignment.
4. Welds not specified shall, if possible, be continuous fillet welds developing the minimum strength, as specified above, using not less than the minimum fillet welds as specified by AISC.
5. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
6. Before welding is started, the fabricator shall submit for the approval of the Owner's Testing Laboratory in consultation with the Architect/Engineer, written Welding Procedure Specification for all joints to be welded. After approval, the Welding Procedure Specification shall be followed without deviation unless specific approval for change is obtained from the Owner's Testing Laboratory and the Architect/Engineer.
7. Before welding, particular attention shall be paid to surface preparation, fit up and cleanliness of surfaces to be welded.
8. Minimum preheat and interpass temperatures for structural steel welding shall be as specified in ANSI/AWS D1.1, except that no welding shall be performed when the ambient temperature is lower than 0 degrees F. The temperature shall be measured from the side opposite that upon which the preheat is applied.
9. The heat, input, length of weld and sequence of weld shall be controlled to prevent distortions. The surfaces to be welded and the filler metals to be used shall be subject to inspection before any welding is performed.
10. Welds shall be sound throughout. There shall be no crack in any weld or weld pass. Welds shall be considered sound if they conform to AWS requirements, as confirmed by non-destructive testing.
11. Welds shall be free from overlap.
12. Craters shall be filled to the full cross section of the welds.
13. For high-strength low-alloy steels, follow welding procedures as recommended by steel producer for exposed and concealed connections.
14. Fabricator and erector shall coordinate welding responsibility at all welded joints.

G. Stress Relieving: All welding sequences shall be such as to reduce the residual stresses due to welding to a minimum value. If high residual stresses are present, stress relieving of joints shall be required. Welded connections shall be detailed and designed to minimize the accumulation and concentration of through-thickness strains due to weld shrinkage.

2.4 BOLTING

A. Bolt Diameter: Minimum bolt diameter shall be 3/4 inch. The difference in diameter between bolts of differing sizes used on the project shall be not less than ¼".

B. Connection Type: Unless noted otherwise on the drawings, all bolted connections shall be snug-tightened using high-strength bolts in standard holes (hole diameter nominally 1/16 inch greater than the nominal bolt diameter) with threads included in the shear planes. Notwithstanding, the contractor shall be responsible to adhere to provisions of AISC Specification Section J1.10, which lists circumstances under which certain connections require pretensioned high strength bolts.

C. Oversize, Short Slotted and Long Slotted Holes: The dimensions and washer requirements of oversize, short slotted, and long slotted holes shall conform to the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Fastener Tension:
1. High strength bolts in snug-tightened joints shall be tightened to a snug tight condition only. Do not pretension bolts in snug-tightened joints the same as if they were in slip-critical joints. The snug-tightened condition is defined as the tightness that exists when all plies are in firm contact. This may usually be attained by a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench.
2. High-strength Bolts in Slip-critical and Pretensioned Joints:
   a. High-strength bolts in slip-critical and pretensioned joints shall be tightened to achieve the minimum bolt tension as specified in the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" when all the fasteners of a joint are tight.
   b. Any of the four methods to tighten bolts specified in the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" may be used to achieve the minimum bolt tension. The tightening procedure that uses direct tension indicator washers shall conform to the requirements of ASTM F 959. Conform to the requirements of ASTM F 1852 for a Twist-Off-Type Tension-Control bolt pretensioning.
   c. The Contractor shall cooperate with the Owner's Testing Laboratory when Arbitration Testing and Inspection is called for due to a disagreement regarding the tension in installed bolts that have been inspected according to the [Structural Testing Laboratory Services Specification.] [Testing and Inspection portion of this specification section.]

E. Washers: Washers under the bolt head and/or nut shall be used as required by the AISC "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Bolt Lubrication: All bolts shall be well lubricated at time of installation. Dry, rusty bolts will not be allowed.

G. Impact Wrenches: Properly sized and lubricated air impact wrenches with adequate air pressure shall be utilized for all bolt installation.

H. New Bolts: All bolts shall be new and shall not be reused.

2.5 CONNECTIONS

A. Conceptual connection details with the required member design forces are shown on the drawings for bidding purposes and are applicable to all connections not designed and completely detailed on the drawings. The conceptual details are provided only to indicate the connection type required and may not fully represent the complexity of the connection as required by the final connection design for the forces they must resist. Except as noted below, the fabricator is responsible for engaging the services of a connection specialty engineer to prepare a final connection design for submission that meets the requirements of the conceptual connection details and resists the indicated design forces. Refer to the drawings and specifications for complete requirements. WPM guideline is to design and detail joint reinforcement in the joint assembly as required and ideally the language below is not included. However exclude the language below only if you are certain that all cases where stiffeners, doubler plates, reinforcing plates or other such connection materials that are required have been documented. If all the connection designs have been indicated on the drawings delete typical.Typical Connection details are indicated on the drawings.

C. Design and Detailing Procedure:
1. Unless noted otherwise or specifically detailed on the drawings, end connections of beams, girders, and trusses shall be designed as flexible and the connection shall accommodate end rotations of the unrestrained beams. Restrained end connections, as indicated on the drawings, shall be designed for the combined effect of bending moment and shears induced by the rigidity of the connection. Forces to be used in the design are described below.
2. The fabricator's detailer shall complete connection detailing using predesigned connections taken directly from the AISC "Steel Construction Manual" or related publications. Where connections are of the type that would normally be selected or completed using information found in tables in the AISC "Steel Construction Manual" or related publications but where conditions are encountered on the project that do not match those assumed in the AISC Manual or other similar publication, the fabricator shall retain a profession engineer, licensed in the jurisdiction the project is located, to design and submit sealed calculations documenting the design and showing details of the assembled joint with the bolts and welds required.
3. The fabricator, his detailer and supervising engineer shall coordinate all connection requirements with the erector. The fabricator is responsible to detail connections that contain the adjustability and all other requirements that allow the erector to erect the structural steel in conformance to all specified tolerances. The fabricator shall be responsible for providing adjustability in all connections between exterior-cladding systems, skylights, and other architectural features and the supporting structural steel as required in achieving the specified tolerances for the architectural feature as specified in the contract documents.

D. Design Intent: It is the intention of the plans and specifications that shop connections be welded or bolted and that field connections be bolted, unless detailed otherwise on the drawings.

E. Flexible (Simple) Beam Connections:
1. All typical beam simple connections shall conform to requirements of the AISC specifications. Refer to the drawings for typical connection types.
2. Seated Beam Connections and Stiffened Seated Beam Connections shall not be used unless indicated on the drawings or unless Engineer approval is obtained to verify capacity of supporting member for the resulting eccentricity. The fabricator must verify and bear responsibility that the use of such connections does not interfere with architectural or MEP requirements.
3. Simple Beam Connection Capacity: Support a factored load reaction R equal to the reaction shown on the plans. Contact the Engineer if no reaction for a beam is shown on the plan. Each connection shall contain not less than the minimum number of bolts shown in the AISC connection tables for each beam size.

F. Restrained (Moment) Connections:
1. Refer to the drawings for Moment Connection Details.
2. Design Reactions for Moment Connected Beams: Shear connections for moment-connected beams shall be designed for the factored reaction shown on the drawings.
3. Design and Furnishing of Reinforcement in Moment Connected Joints: As part of the design responsibility outlined above, the fabricator shall design and furnish all additional reinforcement in moment connected joints to resist the specified design forces unless otherwise specifically detailed on the drawings. Column sections shall be investigated for web shear, web yielding, web buckling, and tension. Stiffeners and/or doubler plates shall be furnished as required by the AISC Specification Section K1.

G. Tightening of Bolts in Welded Moment Connections. At moment connections where beams are complete-joint penetration welded directly to columns or girders in the field, welds shall be made after installation of erection bolts to draw the pieces together and before the final shear connection bolts are tightened. Where loose moment plates are used, such plates shall be groove welded to columns prior to connecting these plates to the beams.

H. Base Plates and Bearing Plates:
1. Finish: All baseplates and bearing plates shall be finished in accordance with AISC Specification M2.8.
2. Attachment to Column: Unless shown otherwise on the drawings, all baseplates and bearing plates shall be welded all around to the column with minimum fillet welds as specified in AISC Specification Table J2.4.
3. Anchor Rod Holes in Baseplates: Hole sizes in baseplates for anchor rods shall be made oversize as described in the AISC "Steel Construction Manual", Table 14-2.

I. Hangers and Braces:
1. Connections for all hangers and braces shall have connections designed to develop the factored axial force shown on the drawings. Contact the Engineer if no force for a member is shown on the drawings.
2. Compression members composed of two or more rolled shapes separated from one another by intermittent fillers shall be connected to one another at such fillers at intervals (not to exceed 48") so that the slenderness ratio l/r of either shape, between the fasteners, does not exceed 75% of the governing slenderness ratio of the built-up member. The least radius of gyration, r, shall be used in computing the slenderness ratio of each component part.

J. Stiffeners: Provide stiffeners finished to bear under load concentrations where shown on the drawings.

K. Steel Shelf Angles: Shelf angles supporting veneer shown on the drawings to be continuous shall be furnished to a maximum length of 20'-0". Provide a 1/4" gap at each joint. The gap shall not be welded. The distance from the joint to the first supporting bolt shall not exceed 40% of the bolt spacing (12" maximum). Shelf angles shall be continuous around corners with corner joint complete-joint penetration welded. The distance to the first supporting bolt from the corner shall not exceed 12".

L. Limitations on Use of A307 Bolts: ASTM A 307 bolts shall not be used in any permanent steel-to-steel or concrete–to-steel connection.

M. Bolts in Combination with Welds: Bolts shall not be considered as sharing the load in combination with welds, except as allowed in AISC Specification Section J1.8.

2.6 SURFACE PREPARATION AND SHOP PRIME PAINTING

A. Specification: Surface preparation, paint, and painting practices shall conform to the "SSPC Painting Manual", Volumes 1 and 2.

B. Scope: All steel shall remain unpainted, except the following:
1. Shop paint surfaces that are to remain exposed to view in the final construction.
2. Shop paint any steel other than weathering steel that, in the final construction, will not be in a controlled environment and is therefore subject to moisture or high humidity infiltration and that has not been specified to be galvanized.
3. Shop paint any steel that is shown on the drawings to receive a finished paint system as defined in Specification Section 09 90 00.

4. Coordinate all shop painting of structural steel with Architect's painting requirements as specified on the architectural drawings and in the specifications. The Fabricator shall be responsible for determining all painting requirements (which surfaces are to be painted or left unpainted) on the project prior to fabrication.

C. Additional Painting Requirements
1. Extend shop paint to 2" from location of welds on surfaces that are to be field welded.
2. If individual elements (including the mating surfaces) of an assembly that is required to be painted are painted prior to welding into an assembly, then all painted surfaces affected by welding shall be touched-up and repaired (according to manufacturer's instructions, if any) to prevent corrosion bleeding.
3. The fabricator shall be responsible to ensure that all elements of all assemblies that are to be painted are fabricated so that no exposed surface shall be subject to stains due to corrosion bleeding during the warranty period of the paint.
4. Structural steel elements that are bolted with slip-critical joints and are required on the drawings to be painted shall have all faying surfaces (including all surfaces of filler plates, member end supplement plates and welds) painted to comply with the specified slip-critical coating requirement.

D. Surface Preparation - Unpainted Steel: All structural steel that is not specified to receive a shop coat of primer paint shall be prepared in accordance with Society for Protective Coatings specifications as follows:
1. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" unless otherwise specified.
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.

E. Surface Preparation and Primer Paint - Shop Painted Steel:
1. Surface Preparation: Prepare the surface of all structural steel specified to be shop painted as required by the paint manufacturer or the Society for Protective Coatings specifications, but not less than the following:
   a. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" unless otherwise specified.
   b. SSPC-SP 6, "Commercial Blast Cleaning" shall be applied to the faying surfaces (including filler and member-end supplement plates, if any) of connections that are noted on the drawings as requiring a slip-critical coating. At a minimum, apply this surface preparation to the area between and surrounding all bolt holes including the area up to 2" outside the outer-most holes.
2. Priming: Immediately after surface preparation, apply primer to all structural steel specified to be shop primed in strict accordance with manufacturer's instructions and the Society for Protective Coatings specifications. Apply paint at a rate to conform to the manufacturer's written instructions and to provide a dry film thickness of not less the 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, welds, and all exposed surfaces. Apply two coats to surfaces that are inaccessible after assembly or erection. Change the color of the second coat to distinguish it from the first coat.
3. Finish Coat: Coordinate shop primer paint requirements with architectural drawings and specifications. The primer selected must be compatible with any specified finish coat.

F. Shop Touch-Up Painting: The Fabricator shall provide for cleaning and touch-up painting of welds, bolted connections (including nuts, bolts, washers, filler plates, member end supplement plates and welds, if any), and abraded areas. Prior to shipment, apply paint to exposed areas using same materials and surface preparation as used for shop painting. Paint shall be applied by brush or spray with minimum dry film thickness of 1.5 mils.

PART 3 - EXECUTION

3.1 ERECTION

A. The Erection work shall comply with the requirements of AISC Specification Section M4.

B. Inspection: Erector shall examine areas and conditions under which structural steel work is to be installed and notify the Contractor and the Architect/Engineer in writing of conditions detrimental to proper and timely completion of the work.

C. Surveys: The following surveys shall be performed.
1. Initial Survey: Check elevations of concrete and masonry bearing surfaces and anchor bolt locations prior to erection and submit any discrepancies to the Engineer prior to the start of erection. Corrections or compensating adjustments to the structural steel shall be made and approved prior to the start of erection.
2. Final Survey: Upon completion of erection of the steel frame, and before the start of work by other trades that may be supported, attached, or applied to the frame, a final survey shall be made and a report submitted certifying compliance with specified tolerances.

D. Erection Tolerances: Erection tolerances of anchor rods, embedded items, and all structural steel shall conform to the AISC Code of Standard Practice, Section 7, unless stricter tolerances are specified elsewhere in the contract documents.

E. Temporary Shoring and Bracing:
1. The lateral-load resisting or stability-providing system and connecting diaphragms are identified on the drawings. Comply with the provisions of the Code of Standard Practice regarding stability of the structure during the erection process, except where stricter requirements are noted herein.
2. Where architectural or MEP requirements do not allow for any temporary supports, members, erection devices, or connections to be left in place permanently or where such items affect the final structural behavior, they shall be removed by the erector. All costs associated therewith shall be included in the bid price.

F. Wherever the erection equipment is supported by the structure, the Contractor shall be responsible for the retention of a licensed professional engineer to determine the adequacy of the member supporting the erection equipment in relation to the loads imposed thereon. The Contractor shall submit to the Architect/Engineer, for review, the loads that will be imposed by the erection equipment on the building structure. Where the imposed load exceeds the allowable strength, the Contractor shall be responsible for any additional materials, supports, bracing, connections and similar measures required to support the imposed load of the equipment while in use, subject to review by the Architect/Engineer.

G. Anchor Rods: Furnish anchor rods and other connectors required for securing structural steel to foundations and other in-place work. Furnish 1/8" minimum steel templates for presetting bolts and other anchors to accurate locations. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout. Use only steel wedges or shims.

H. Base Plates and Bearing Plates: Remove loose latent material from bearing surfaces and base and bearing plates. Set plates to the elevation indicated on the drawings and level using steel shims (plastic shims will not be allowed) or by three leveling screws with weldments at the plate edges. After all protruding plates have been trimmed, grout plates solidly between bearing surfaces using the specified grout, ensuring no voids are present. Finish exposed surfaces, protect installed materials, and allow to wet-cure. For proprietary grout materials, comply with manufacturer's instructions. Tighten anchor bolts after supported members have been positioned and plumbed.

I. Splices: Splices will be permitted only where indicated on the contract drawings and approved shop drawings. Fastenings of splices of compression members shall be done after the abutting surfaces have been brought completely into contact within AISC tolerances. Bearing surfaces and surfaces that will be in permanent contact are to be cleaned before the members are assembled.

J. Field Assembly of Structural Steel:
1. As erection of the steel progresses, the work shall be fastened securely to safely carry all dead load, wind and erection forces. Particular care shall be exercised to ensure straightness and tautness of bracing immediately upon raising a steel column.
2. Provide temporary planking and working platforms as necessary to effectively complete work.
3. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure within specified AISC tolerances. The Contractor shall coordinate with Erector and Fabricator regarding possible discrepancies in member lengths between temperature at time of fabrication and temperatures during erection, and shall make necessary adjustments to ensure plumbness within AISC tolerances at 70°F. Compensate for cumulative welding draw, construction loadings, sequential applications of dead loads, or any other predictable conditions that could cause distortions to exceed tolerance limitations.
4. On welded construction exposed to view or weather, remove erection bolts, fill holes with plug welds or filler and grind smooth at exposed surfaces.
5. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces receiving field welds.
6. Comply with all bolting and welding requirements of Part 2 of this specification section.

K. Field Modifications to Structural Steel: Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and structural fitting of parts shall be reported immediately to the Architect/Engineer, and approval of the method of correction shall be obtained. Approved corrections shall be made at no additional cost to the Owner. Do not use cutting torches, reamers, or other devices in the field for unauthorized correction of fabrication errors.

L. Miscellaneous Framing: Provide supplemental structural steel support framing for steel deck where columns, or other framing members or floor openings interrupt normal deck bearing whether shown or not on the architectural, mechanical, or structural drawings.

M. Removal of Erection Aids and Devices: The erector shall remove all erection aids and devices that interfere with architectural finish or MEP requirements.

N. Field Touch-Up Painting:
1. Clean field welds, unpainted areas of bolted connections (including all exposed areas of nuts, bolts, washers, filler plates, member end supplement plates, and welds), and any shop painted areas that are abraded. Apply paint to all exposed areas using same material and surface preparation as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.
2. Clean field welds, ungalvanized areas of bolted connections (including all exposed areas of nuts, bolts, washers, filler plates, member end supplement plates, and welds), and any galvanized areas that are abraded. Prepare surfaces and apply specified galvanizing repair paint in accordance with ASTM A 780.
3. The Contractor shall ensure that, at the substantial completion of the project, all structural steel, bolted and/or welded, required to be painted shall have all necessary steel surfaces painted (including touch-up painting as required) to prevent corrosion bleeding.

O. Shear Connector Installation:
1. Composite Beams:
a. Studs shall be welded in the field (not the shop) using automatically timed stud welding equipment.
b. The top flange of the beams must be unpainted and free of heavy rust, mill scale, dirt, sand or other foreign material which will interfere with the welding operation.
c. The steel deck must be free of dirt, sand, oil, or other foreign material and must be dry and free of moisture. Steel deck must rest tightly on the beam flange. Welding must take place through only one thickness of deck.
d. Stud Spacing: Studs shall be spaced on beams and girders as shown on the drawings.

P. Headed Stud Anchor Installation:
1. Steel Plates Embedded in Concrete:
a. Studs shall be welded using automatically timed stud welding equipment.
b. Plates must be unpainted and free of heavy rust, mill scale, dirt, sand or other foreign material that will interfere with the welding operation.

Q. Clean Up: Clean up all debris caused by the Work of this Section, keeping the premises neat and clean at all times.

3.2 QUALITY ASSURANCE TESTING AND INSPECTION DURING CONSTRUCTION
A. See Testing Laboratory Services section of these Specifications for structural steel materials Delete paragraph below for Florida projects that have a Threshold Inspection Plan (a separate document usually on the drawings).

END OF SECTION 05 12 00

SECTION 05 31 23 STEEL ROOF DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SCOPE OF WORK

A. Supplier: The steel deck supplier shall furnish all steel deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, steel deck edge closures, cell closures, cant strips, sump pans, and all related accessories.

B. Erector: The Subcontractor responsible for erecting the steel deck shall provide all labor and equipment as required to place all steel deck components and accessories as described above.

1.3 QUALIFICATIONS

A. The steel deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.4 QUALITY ASSURANCE

A. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

B. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified:
   1. SDI, "Design Manual for Composite Decks, Form Decks, and Roof Decks."
   2. AISI, "Specification for the Design of Cold Formed Steel Structural Members."
   3. AWS D1.3, "Structural Welding Code – Sheet Steel."

C. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

D. Underwriters Laboratories Classifications:
   1. Provide steel deck units which are listed and conform to Underwriters Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific fire-resistant system detailed.
   2. Provide units and construction meeting the requirements of Construction No. 157 as listed in the 2000 UL "Roofing Materials & Systems Directory" under Roof Deck Constructions (TGKX) and rated as a Class 90 assembly. and with each deck unit bearing the UL label and marking for specific wind-rated system detailed.

1.5 SUBMITTALS

A. Product Certification: Submit manufacturer's specifications and installation instructions for each type of deck specified. Also submit a certificate of product compliance with SDI Standards as specified.

B. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, supplementary framing, and all other accessories.

C. Insurance Certification: Assist Architect and Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire, windstorm, and extended coverage insurance.

D. Welding Certificates: Submit Copies of certificates for welding procedures and personnel.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. See General Notes on the drawings for the location, depth of deck, design thickness, and type of deck required.

B. Acceptable manufacturers include the following
1. Canam Steel Corp.
2. United Steel Deck, Inc.
3. Vulcraft/Div. Nucor Corp.
4. Wheeling Corrugating Co.
5. Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADES OF STEEL

A. Steel deck shall be manufactured from steel conforming to ASTM A1008 Grades C, D, or E for painted deck or A653, Structural Steel Grade for galvanized deck or Engineer approved equal, having a minimum yield strength of 33,000 PSI.

2.3 FINISH

A. Galvanizing: Steel deck shall be galvanized with a protective zinc coating conforming to ASTM A653 G 90.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Department of Defense Specifications DOD-P-21035.

2.4 ROOF DECK ACCESSORIES

A. Provide minimum 20 gauge ridge and valley plates, minimum 20 gauge cant strips, minimum 14 gauge sump pans, minimum 20 gauge inside or outside closure channels angles or plates, minimum 20 gauge butt strips at change of deck directions, and minimum 20 gauge filler sheets.

2.5 MECHANICAL FASTENERS

A. Powder-Actuated or Pneumatically Driven Pins: Provide corrosion-resistant, powder-actuated or pneumatically driven fasteners manufactured from steel conforming to AISI 1060 or 1061 steel, austempered to a core hardness of 52 to 58 Rockwell C. Fasteners shall have a knurled shank and shall be zinc-plated in accordance with ASTM B633, Sc. I, Type III.
1. Subject to compliance with requirements, provide products of one of the following manufacturers:
a. Hilti, Inc.
b. ITWBuildex.
c. Pneutek, Inc.

B. Self-Drilling Screw Fasteners: Provide corrosion-resistant, hexagonal head, steel self drilling screws, austempered to a core hardness of Rockwell C 50.
1. Subject to compliance with requirements, provide products of one of the following manufacturers:
a. ITWBuildex.

b. Grabber Construction Products.
c. SFS Intec Fastening Systems, Inc., Wyomissing.
d. Textron Fastening Systems.

2.6 SIDE-LAP FASTENERS:

A. Provide Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

2.7 FABRICATION

A. General: Fabricate deck panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck", in SDI Publication No. 29, and the following.

B. Steel Deck Spans: Where possible, all steel deck shall extend over three or more supports. Single span deck is prohibited.

2.8 ROOF OPENINGS

A. Provide a 20 gage galvanized flat plate to reinforce openings in roof deck that are greater than 6" and less than 10" in any one direction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturers recommendations and approved shop drawings, and as specified herein:
1. Place deck units on supporting framework and adjust to final position with accurately aligned side laps and ends bearing 2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks. Place the end joint over a chord angle for deck bearing on steel bar joists.
2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
6. Do not use roof deck units for storage or working platforms until permanently secured.

B. Attachment of Roof Deck:
1. The method of attachment, attachment pattern, and side lap fastener type and spacing shall be as shown on the drawings and comply with the requirements noted below.
2. Method of Attachment: The attachment method noted in the drawings shall comply with the applicable requirements below.
a. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Weld metal shall penetrate all layers of deck material at end laps and side joints and shall have good fusion to the supporting member. Welding washers shall be used only when welding steel deck less than 0.028" thickness. The diameter of the puddle weld on the

supporting member shall be, at a minimum, the diameter stated in the drawings but no less than 1/2 inch.

b. Powder-Actuated or Pneumatically Driven Pins: An operator licensed by the pin manufacturer shall install all pins. Comply with the manufacturer's requirements to install the pins through all layers of the deck material and the manufacturer's required embedment into the supporting member.

c. Self-Drilling Fasteners: Comply with the manufacturer's requirements to install the screws through all layers of the deck material and the manufacturer's required embedment into the supporting member.

3. Side Lap Fastening: Unless required otherwise by provisions of this specification, side laps of adjacent units shall be fastened by #10 (min.) TEK screws so that spacing between supports and fasteners does not exceed the value prescribed on the drawings. Button Punching is not allowable as a side-lap fastener.

4. End Bearing: Provide a minimum end bearing of 2" over supports.

5. End Joints: End joints of sheets shall be lapped 2" minimum over supports. Decks that slope 1/4 inch or more in 12 inches in the long direction shall be erected beginning at the low side to insure that end laps are shingle fashion.

6. Underwriters Laboratories Wind Uplift Classification Requirements: Unless a more stringent attachment requirement is specified elsewhere in this specification or on the drawings, roof deck units shall be attached to the supporting structure as required by the Construction Number specified elsewhere in this section.

7. Attachment to Girders: At locations noted in the drawings, attach the deck to steel members that are parallel to the deck flutes in accordance with the requirements noted in the drawings.

C. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

D. Reinforcement at Openings: Roof openings less than 6" square or diameter require no reinforcement. Openings 6" to 10" inclusive shall be reinforced with a 20 gauge galvanized plate welded to the deck at each corner and 6" maximum centers with a 5/8" diameter puddle weld or sheet metal screws. For openings greater than 10" in diameter or width, refer to the drawings and structural steel specifications for additional framing to support the deck around the opening.

E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld in each corner.

F. Joint Covers: Provide steel joint covers at changes in direction of deck units, except where taped joints are specified.

G. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

3.2 TOUCH-UP PAINTING

A. After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

B. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

C. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

D. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.3 QUALITY ASSURANCE INSPECTION DURING CONSTRUCTION

A. The method of attaching the deck to the frame is subject to inspection by the Owner's designated Testing Laboratory. The Contractor shall, at its own expense, remove work found to be defective and replace with new acceptable work.

B. The Owner shall engage a qualified testing and inspection agency (The Owner's Testing Laboratory) to perform the following inspections and prepare reports.

1. Welding or Self-drilling Fasteners
   a. Visually inspect 100% of the attachment of the steel deck to the structural frame and at side laps.
   b. Periodically monitor the method of attaching the steel deck to the structural frame.
2. Powder-actuated or pneumatically-driven pins
   a. Visually inspect 100% of the Powder-Actuated or Compressed-Air fasteners using an inspection gauge supplied by the manufacturer to verify that the stand-off distance from the top of the deck is in accordance with the manufacturer's requirements.

END OF SECTION 05 31 23

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 - GENERAL REQUIREMENTS

1.01 SCOPE

A. Section includes:

1. Wood blocking, framing, cants, nailers, sills
2. Wood furring and grounds
3. Sheathing
4. Plywood backing panels

B. Furnish, erect, and perform all carpentry at site and appurtenant work as shown and specified. Install doors, finish carpentry and finish hardware, etc.

1.02 GENERAL REQUIREMENTS

A. Guarantee: Contractor shall guarantee the operation of all moving parts for one year after completion and occupancy. Contractor shall adjust and properly fit all doors, locks, and other movable parts for the year-long period at no cost to the owner.

B. Workmanship: All material shall be installed in a workmanlike manner, free from hammer marks, blemishes, stains and other disfigurations which will not permit a satisfactory finish. Nails for finish woodwork shall be finishing nails and carefully set. Workmanship shall be of best quality, accurate cuts, square bearing, close fitting, plumb and level, to lines and levels indicated, secured rigidly in place.

C. Standards: Materials, construction, fastening devices, etc. American Plywood Association, Gypsum Association, and Southern Standard Building Code. Grades of all lumber shall be as defined by the Association of Lumber Manufacturers producing the material and shall bear the inspection bureau's grade marking.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 6 inches above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.04 APPLICABLE STANDARDS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA): National Design Specification for Wood Construction

C. WCD Number 1-01 Conventional Wood Frame Construction

D. American Institute of Timber Construction (AITC): A190.1-02 Structural Glued Laminated Timber

E. American Society of Mechanical Engineers (ASME): B18.2.1A-99 Square and Hex Bolts and Screws; B18.2.2-87 (R99) Square and Hex Nuts; B18.6.1-81 (R97) Wood Screws; B18.6.4-98 Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws

F. American Plywood Association (APA): E30-03 Engineered Wood Construction Guide

G. American Society for Testing And Materials (ASTM):

1.	A47-(R04)	Ferritic Malleable Iron Castings;
2.	A48-03	Gray Iron Castings;
3.	A653/A653M-05	Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
4.	C954-04	Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness
5.	C1002-04	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs
6.	D143-(R00)	Small Clear Specimens of Timber, Method of Testing
7.	D1760-01	Pressure Treatment of Timber Products
8.	D2559-04	Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
9.	D3498-03	Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
10.	F844-04	Washers, Steel, Plan (Flat) Unhardened for General Use
11.	F1667-03	Nails, Spikes, and Staples

H. Federal Specifications (Fed. Spec.):

1. MM-L-736C Lumber; Hardwood
2. Commercial Item Description (CID): A-A-55615 Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

I. U.S. Department of Commerce Product Standard (PS)

1. PS 1-95 Construction and Industrial Plywood
2. PS 20-70 (R86) American Softwood Lumber Standard
3. PS 58-74 Basic Hardboard

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

B.. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.

C. Structural Members: Species and grade as listed in the AFPA, National Design Specification for Wood Construction having design stresses as shown.

D. Lumber Other Than Structural: Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.

E. Framing lumber: Minimum extreme fiber stress in bending of 1100.

F. Furring, blocking, nailers and similar items 4 inches and narrower Standard Grade; and, members 6 inches and wider, Number 2 Grade.

G. Sizes:

1. Conforming to Prod. Std., PS20.
2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

H. Moisture Content:

1. At time of delivery and maintained at the site.
2. Boards and lumber 2 inches and less in thickness: 19 percent or less.
3. Lumber over 2 inches thick: 25 percent or less.

I. Preservative Treatment:

1. Do not treat Heart Redwood and Western Red Cedar.
2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
3. Treat other members specified as preservative treated (PT).
4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.02 WOOD MATERIAL

A. Lumber: Shall be sound, thoroughly seasoned, well manufactured S4S, and free from warp that cannot be corrected by bridging or nailing.

1. Non-Stressed Graded Lumber:

a. Douglas Fir #2, S4S, kiln-dried.
b. Southern Pine #2, S4S, kiln-dried.

2. Stress Graded Lumber: Southern Pine, 1100f or as indicated on the drawings, S4S, kiln-dried.

b. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

c. Mark each treated item with treatment quality mark of an incspection agency approved by the American Lumber Standards Committee 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, stripping, and similar concealed members in contact with masonry or concrete.

3) Wood framing members less than 18 inches (460 mm) above grade.

4) Wood floor plates that are installed over concrete slabs directly in contact with earth.

B. Miscellaneous Lumber

1. Provide lumber for support of attachments or other construction including rooftop equipment bases and support curbs, blocking, cants, nailers, furring and grounds.

2. For items of dimensional lumber size, provide standard, stud or No 3 grade lumber with 19 percent maximum moisture content and any of the following species:

a. Mixed Southern Pine; SPIB
b. Hem-fir or Hem-fir (north); NLGA, WCLIB or WWPA
c. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB or WWPA

3. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:

a. Mixed Southern Pine, No. 2 grade; SPIB
b. Hem-fir or Hem-fir (north), Construction or 2 Common Standard or 3 Common grade; NELMA, NLGA, WCLIB or WWPA

4. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent nails and damage to paneling.

C. Plywood, General Use: American Plywood Association grading rules, 4’ x 8’ or largest practical size; 3/4" thick.

1. Interior use, Grade A-D, Int-DFPA.

2. Exterior use, Grade A-D, Ext-DFPA as needed at specific location.

D. Plywood Backing Panels: Provide plywood backing panels as required for telephone equipment, electrical equipment, fire alarm equipment, security system equipment and owner technology equipment. Panels to be DOC PS 1, Exposure 1, C-D Plugged, fire retardant treated; 3/4” thick.

2.03 WOOD TREATMENT

A. Fire Retardant Treatment

1) Lumber shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All lumber must be dried following treatment in accordance with AWPA Standard C20.

2) Plywood shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All lumber must be dried following treatment in accordance with AWPA Standard C27.

B. Preservative Treatment (Concealed Conditions)

1) Micronized Copper Quaternary (MCQ): Pressure impregnate preservative to net retention of 0.15 lbs/cu.ft. in plant licensed by manufacturer.

2) Provide Quality Mark Stamp or end tag identifying third party inspection agency on treated wood for identification.

3) Fasteners: Metal fasteners in contact with preservative treated wood shall be G-90 galvanized, minimum, or stainless steel in accordance with manufacturer's instructions. No uncoated steel shall come in contact with preservative treated wood.

4) ACQ and CCA preservatives not permitted.

5) Acceptable manufacturers include Osmose "MicroPro" Smart Sense or approved equal.

2.04 ROUGH HARDWARE AND ADHESIVES:

A. Anchor Bolts:

1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 13 mm (1/2 inch) bolt unless shown otherwise.

C. Washers: ASTM F844. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:

1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:

1. Size and type best suited for purpose unless noted otherwise. Use aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.

2. ASTM F1667:
   a. Common: Type I, Style 10.
   b. Concrete: Type I, Style 11.
   c. Barbed: Type I, Style 26.
   d. Underlayment: Type I, Style 25.
   e. Masonry: Type I, Style 27.
   f. Use special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

F. Metal Bridging:

1. Optional to wood bridging.
2. V shape deformed strap with not less than 2 nail holes at ends, designed to nail to top and side of framing member and bottom and side of opposite member.

3. Not less than 19 mm by 125 mm (3/4 by 5 inches) bendable nailing flange on ends.

4. Fabricated of 1 mm (0.04 inch) minimum thick sheet.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fastening Schedule - Comply with requirements of IBC, Table 2304.9.1 “Fastening Schedule” for all wood connections.

B. Grounds, Blocking, and Furring: Provide wood blocking for the anchorage of items furnished under other sections. Provide all incidental furring not specifically shown or specified to carry out the intent of the project design.
1. Set all grounds and concealed blocking throughout building, substantially attached to studs or masonry partitions, for nailing and anchoring interior wood trim, millwork, cabinets and other items furnished by other trades.

2. Grounds shall be continuous, straight, and plumb or level in true alignment. Wood blocking to receive other connections and equipment shall be provided. Unless otherwise indicated, all nailers, grounds, stripping, etc., shall be spaced not over 16” o.c. Provide countersunk holes for mechanical fasteners.

3. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

C. Rough Hardware: Furnish and install all rough hardware such as bolts, nuts and washers, screws, expansion bolts, toggle bolts, lag bolts, etc., not otherwise shown or specified but necessary to make a complete job.

D. Miscellaneous Specialty Items: Shall be set level and shall be well-secured and scribed to fit job site conditions.

E. Wall sheathing installation: Install 8 ft. dimension horizontal with tightly butted, staggered joints. After installation of sheathing, dampproof all surfaces of sheathing, screw and nail holes, penetrations, gaps, cracks, and voids of any sort as follows.

1. Apply a 3/8” bead of sealant to all joints, voids, penetrations, etc. and trowel in firmly until flat. Apply enough of the same material to each fastener to cover completely when troweled flat. Application rate as recommended by manufacturer. Use backer rod for openings over 1/8” in width. Sealant material shall be equal to Dow Corning 795 or Pecora 895 Building Sealant.

2. Apply fiberglass joint tape to joints, dampproof coating to entire surface of sheathing and install membrane flashing around perimeter of system. Mop in membrane flashing to face with dampproofing. Membrane flashing is required at penetrations, at perimeter, where sheathing transitions to other materials above doors and windows, above openings, at base of exterior wall, etc. and at uneven planes for a complete watertight exterior vapor barrier.

3. System shall provide a complete waterproof vapor barrier to stop moisture at face of sheathing and deliver water to cavity drainage systems.

4. Seal all edges of sheathing exposed to moisture.

F. Workmanship: Workmanship shall be of best quality, accurate cuts, square bearing, close fitting, plumb and level, to lines and level indicated, secured rigidly in place. All material shall be installed in a workmanlike manner, free from hammer marks, blemishes, stains, and other disfigurations. Nails for finish woodwork shall be finishing nails carefully set.

END OF SECTION 06 10 00

SECTION 07 26 00 **FLUID APPLIED AIR BARRIER**

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies a water resistant fluid applied air and vapor barrier in exterior wall assemblies including but not limited to these locations:

1. Foundation and walls, including penetrations, ties and anchors.
2. Walls, windows, curtain walls, storefronts, louvers or doors.
3. Different wall assemblies, and fixed openings within those assemblies.
4. Wall and roof connections and penetrations.
5. Floors over unconditioned space.
6. Walls, floor and roof across construction, control and expansion joints.
7. Walls, floors and roof to utility, pipe and duct penetrations.
8. Seismic and expansion joints.
9. All other leakage pathways in the building envelope.

1.2 PERFORMANCE REQUIREMENTS

A. Material Performance: Provide materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 psf) (0.02 Llm2 @ 75 Pa.) when tested according to ASTM E 2178.

B. Provide material with a perm rating of greater than 10 perms when tested according to ASTM E96 - water method. (07 26 00)

1.3 SUBMITTALS

A. Submit in accordance with Division 1 requirements.

B. Product Data: Submit manufacturer's product data, installation instructions, and manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.

C. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.

D. Include statement that materials are compatible with adjacent materials proposed for use.

E. Submit manufacturer's specifications and other data needed to prove compliance with specified requirements.

F. Submit manufacturer's installation instructions and manufacturer's affidavit that materials used in Project contain no asbestos, lead, or PCB's.

G. Submit reports indicating that field peel-adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.

H. Samples: Submit clearly labeled samples, 3 by 4 inch minimum size of each material specified.

I. Shop Drawings of Mock-Up: Submit shop drawings of proposed mock-ups showing plans, elevations, isometric details, installation sequence, and connections to the test apparatus.

J. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

K. Shop Drawings: Submit shop drawings showing locations and extent of air and vapor barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the air and vapor barrier are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.

1. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
2. Include statement that materials are compatible with adjacent materials proposed for use.
3. Include recommended values for field adhesion test on each substrate.

L. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from manufacturer stating that cleaning materials used during installation are chemically compatible with each of the adjacent materials proposed for use. Submit letter from manufacturer for certification of compatibility with rigid insulation specified in Section 07 21 00.

1.4 QUALITY ASSURANCE

A. Air Barrier Installer Qualifications: Currently accredited by the Air Barrier Association of America (ABAA) whose applicators are certified in accordance with the ABAA Quality Assurance Program.

B. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air and vapor barrier membranes. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

C. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

D. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds for the specific authority having jurisdiction.

1.5 PRE-CONSTRUCTION MEETING

A. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section.
1. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction.

2. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

1.6 FIELD QUALITY CONTROL

A. Do not cover air and vapor barrier until it has been inspected, tested and accepted.

B. Mock-Ups: Build mock-up representative of primary exterior wall assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Architect.

C. Mock-up shall be approximately 8 feet long by 8 feet high and include the materials proposed for use in the exterior wall assembly. Mock-up shall be suitable for testing as specified in the following paragraph.

D. Mock-Up Tests for Air and Water Infiltration: Test mock-up for air and water infiltration in accordance with ASTM E 1186 (air leakage location) or ASTM E 783 (air leakage quantification), and ASTM E 1105 (water penetration).

E. Use smoke tracer to locate sources of air leakage. If deficiencies are found, repair or modify mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond values specified, uncontrolled water leakage, unsatisfactory workmanship.

1. Perform the air leakage tests and water penetration test of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements. For fasteners which would normally only be installed with cladding, install representative fasteners without cladding; intent is to perform testing with all types of penetrations in place.

F. Mock-Up Tests for Adhesion: Test mock-up of fluid applied and sheet applied materials for adhesion in accordance with ASTM 0 4541 using a Type 1 pull tester except that the disk used shall be 100mm in diameter and the membrane shall be cut through to separate the material attached to the disk from the surrounding material.

1. Perform test after curing period recommended by the manufacturer. Record mode of failure and area which failed in accordance with ASTM 0 4541.

2. When the air barrier material manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met. Where the manufacturer has not declared a record the value.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air and vapor barrier membrane manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with manufacturer's recommendations.

1.8 PROJECT CONDITIONS

A. Temperature: Install air and vapor barrier within range of ambient and substrate temperatures recommended by air and vapor barrier manufacturer.

B. Field Conditions: Do not install air and vapor barrier in snow, rain, fog, or mist without temporary protection and supplemental heat as required. Do not install air and vapor barrier

when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer. Apply membrane to a surface dry substrate, or in accordance with manufacturer's recommendations.

1.9 WARRANTY

A. Material Warranty: Provide manufacturer's standard product warranty, for a minimum 10 years from date of Substantial Completion.

B. Installation Warranty: Provide air barrier subcontractor's 2 year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion, failure to cure properly.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fluid Applied Air and Vapor Barrier: Fluid applied proprietary materials as specified. Use regular or low-temperature formulation depending on site conditions, within temperature ranges specified by manufacturer. Provide related accessories including primer, seam tape, mastic, fluid and sealant recommended by manufacturer. Subject to compliance with requirements, provide one of the following:

2. Carlisle Coatings and Waterproofing – Fire-Resist Barritech NP, 70 to 80 mil thick
3. Grace Construction Products – Perm-A-Barrier Liquid, 60 mil thick (wet)
4. Henry Company – Air Bloc 32MR, 75 to 115 mil thick (wet)
6. TK Products – TK AirMax 2102 VOC, 40-45 mil (wet), 22-25 mil (dry) or AirMax 2103 water based, 40 mil (wet)
7. W.R. Meadows, Inc. – Air Shield LM, 60 mil (wet) 45 mils (dry)

B. Provide all related system recommended flashing, counterflashing, fabric reinforcement, primer, mastic, fill compound, transition strips, adhesive, tapes, caulking, sealants as required for a complete watertight installation.

2.2 AUXILIARY MATERIALS

A. Membrane at Transitions in Substrate and Connections to Adjacent Elements: Neoprene, ASTM D 2000 Designation 2BC415 to 3BC620, 50 to 65 mils (1.3 mm to 1.6 mm) thick with non-corrosive termination bars and fasteners. Adhesive and lap sealant as recommended by manufacturer.

B. Transition Membrane Between Air and Vapor Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air and vapor barrier manufacturer's recommendations and roofing material manufacturer's recommendations.

C. Provide primers, glass fabric scrim tape, mastic, and other materials not specifically described, but required for a complete and proper installation as instructed by the dampproofing manufacturer or required.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which air and vapor barrier assemblies will be applied, with Installer present, for compliance with requirements.

1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

2. Do not proceed with installation until after minimum concrete curing period recommended by air and vapor barrier manufacturer.

3. Ensure that the following conditions are met:

   a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants
   b. Concrete surfaces are cured and dry, smooth without large voids, spa lied areas or sharp protrusions.
   c. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

4. Verify substrate is surface dry. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test. Surface dry is an acceptable substrate condition if acceptable to the manufacturer.

5. Verify sealants used in sheathing are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.

6. Notify Architect in writing of anticipated problems using air and vapor barrier over substrate prior to proceeding.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air and vapor barrier application. Mask off adjoining surfaces to prevent overspray and spillage.

B. Surface Preparation (Masonry): Dust, dirt, old loose or scaling coatings should be removed from the surface before coating.

1. Cracks, joints, penetrations, and splits should be sealed, repaired with four (4) inch wide glass fabric scrim tape embedded in Henry #789, or manufacturers approved equal.

2. Dusty or porous masonry surfaces should be dampened with water. Highly porous masonry should be primed with Henry #792 Penetrating Asphalt Primer or #788 Non-Fibered Asphalt Emulsion Dampproofing which has been thinned with one (1) gallon water per five (5) gallons of #788, or manufacturers approved equal.

3. Cleaned metal surfaces should also be primed. Architect must approve the surface preparation and sealing of cracks, joints and other penetrations prior to the application of the dampproofing.

C. Surface Preparation (Sheathing): Prep joints and penetrations in exterior sheathing per sheathing manufacturer's instructions.

D. Prime substrate for application of sheet membrane transition strips as recommended by manufacturer and as follows:
1. Prime masonry, concrete substrates with conditioning primer.
2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
3. Prime wood, metal, and painted substrates with primer.
4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air and vapor barrier and at protrusions.

E. Prime substrate for application of fluid applied air and vapor barrier if recommended by manufacturer based on project conditions and as follows in Installation subsection.

3.3 INSTALLATION

A. Air and Vapor Barrier Installation: Install transition strip materials and fluid applied air and vapor barrier to provide continuity throughout the building envelope. Install materials in accordance with manufacturer's recommendations and as follows, unless manufacturer recommends other procedures in writing based on project conditions or particular requirements of their recommended materials:

1. Apply under normal working conditions above 45 degrees F and rising. Do not apply when rain is imminent.

2. Apply with brush or spray equipment. Soft brushes free from stiff bristles should be used and the material applied in even strokes. When spraying, apply in one coat with a 50% overlap of the spray pattern to obtain a uniform and continuous coating, carrying coating in and around joints, grooves, and slots, following reveals and soffits of windows, and continuing 12 inches out on adjoining partitions and soffits as instructed by manufacturer.

3. Insure continuous coating free of breaks, voids and pinholes.

4. Thoroughly cover all cracks, joints, and corners.

5. Provide fluid applied air and vapor barrier and transition strips in all exterior cavity walls on concrete masonry units, and on all exterior sheathing including, but not limited to, areas above soffits, doors and windows, and behind stucco and plaster.

6. Apply primer for transition strips at rate recommended by manufacturer. Allow primer to dry completely before transition strip application. Apply as many coats as necessary for proper adhesion.

7. Apply primer for fluid applied air and vapor barrier as recommended by fluid applied air and vapor barrier manufacturer. Based on manufacturer's recommendation, no primer may be required for the fluid applied materials.

8. Apply fluid applied air and vapor barrier using equipment and methods recommended by manufacturer, to achieve a dry film thickness as recommended by the manufacturer.

9. Apply fluid applied air and vapor barrier and transition strips to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.

10. Position subsequent sheets of transition strips applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll into place with roller.

11 . Overlap horizontally adjacent pieces of transition strips a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll seams with roller.

12. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counterflashing or other procedure in accordance with manufacturer's recommendations.

13. Connect air and vapor barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors and other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.

14. At changes in substrate plane, provide transition material (bead of sealant, mastic, extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.

15. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate or as recommended by the manufacturer.

16. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer's recommended membrane counterflashing to seal top of through-wall flashing to membrane or as recommended by manufacturer. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.

17. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.

18. At expansion and seismic joints provide transition to the joint assemblies.

19. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.

20. At end of each working day, seal top edge of the self-adhered membrane to substrate with termination mastic.

21 . Do not allow materials to come in contact with chemically incompatible materials.

22. Do not expose membrane to sunlight longer than as recommended by the manufacturer.

23. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Cooperate with Owner's testing agency. Allow access to work areas and staging. Notify Owner's testing agency in writing of schedule for Work of this Section to allow sufficient time

for testing and inspection. Daily inspection and testing may be required. Do not cover Work of this Section until testing and inspection is accepted.

1. Final Inspection: The final inspection of the installed material will be done by the manufacturer's technical representative.

B. Twenty (20) days after completion of this portion of the work, at the discretion of the Architect, demonstrate by running water test that the Work of this Section will successfully repel water.

1. Notify the Architect at least 72 hours in advance and conduct the test in the Architect's presence.
2. By means of an outrigger, or similar acceptable equipment, place the nozzle of a 3/4 inch garden hose at a point approximately 10 feet-O inches away from top of wall where approved by the Architect, aiming the nozzle at slight downward angle to direct full stream of water onto wall.
3. Run water onto wall at full available force for not less than four (4) hours.
4. Upon completion of the four (4) hour period, inspect interior surfaces of wall for evidence of moisture penetration.

C. If evidence of moisture penetration is discovered, apply an additional coat of approved fluid applied air and vapor barrier and/or transition strips to exterior surface in areas directed by the Architect, repeating application and testing (at no additional cost to the Owner) until no evidence of moisture penetration is found.

3.5 PROTECTING AND CLEANING

A. Protect air and vapor barrier assemblies from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Coordinate with installation of materials which cover air and vapor membrane, to ensure exposure period does not exceed that recommended by the air and vapor barrier manufacturer.

2. Keep container tightly sealed and protect from freezing in shipping and storage.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION 07 26 00

SECTION 07 41 13 STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes standing-seam metal roof panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review structural loading limitations of [**deck**] [**purlins and rafters**] during and after roofing.
6. Review flashings, special details, drainage, penetrations, and condition of other construction that affect metal panels.
7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
8. Review temporary protection requirements for metal panel systems during and after installation.
9. Review procedures for repair of metal panels damaged after installation.
10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3 inches per 12 inches (1:5).

C. Calculations:
   1. Include calculations with registered engineer seal, verifying roof panel and attachment method resist wind pressures imposed on it pursuant to applicable building codes.

D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
   1. Include similar Samples of trim and accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Manufacturer and Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in architectural sheet metal products.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels until installation. Remove as panels are being installed. Verify film is not left on installed panels.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Galvalume Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, or perforating.
      b. Deterioration of metals and other materials beyond normal weathering.

   2. Warranty Period: 20 years and 6 months from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, chipping, peeling, or failure of paint to adhere to bare metal.

   2. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Special Watertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, within specified warranty period.

   1. Warranty Period: 20 years from date of Substantial Completion.
   2. Shop drawings must be provided to, reviewed, and approved by panel manufacturer prior to panel system installation.
   3. Inspections by panel system manufacturer technical representative are required. Perform first inspection when underlayment and flashing are in place and second inspection when the roof is complete.

D. Special Installer Warranty: Furnish a written warranty signed by the Panel Applicator guaranteeing materials and workmanship for watertightness of the roofing system, flashings, penetrations, and against all leaks.

   1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

   1. Wind Loads: As indicated on Drawings.
   2. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 1680 and ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 and ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 15 lbf/sq. ft. (718.2 Pa).

D. Hydrostatic Head Resistance: No water penetration when tested according to ASTM E2140.

E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.

1. Uplift Rating: UL 90.

2.2 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.

B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Berridge Manufacturing Company; Double-Lock Zee-Lock (180° Seam) or comparable product by one of the following:

a. Pac-Clad
b. MBCI

2. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: 0.024 inch (0.61 mm)
b. Exterior Finish: Two-coat fluoropolymer.
c. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling.
d. Color: As selected by Architect from manufacturer's full range

3. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), 3105 alloy, with H14 temper as required to suit forming operations and structural performance required.

    a. Thickness: 0.032 inch (0.81 mm).
    b. Surface: Smooth, flat finish.
    c. Exterior Finish: Two-coat fluoropolymer.
    d. Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling.
    e. Color: As selected by Architect from manufacturer's full range.

4. Clips: Continuous Zee-rib to accommodate thermal movement.
    a. Material: 0.064-inch (1.63-mm) nominal thickness, zinc coated (galvanized) base with 0.033 inch (0.84 mm) stainless-steel top.

5. Joint Type: Double folded.
6. Panel Coverage: 16 inches (406 mm).
7. Panel Height: 2.0 inches (51 mm).

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils (1.02 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Grace Ultra
    b. Mid-States Asphalt Quick Stick HT Pro
    c. Polyglass Polystick MTS
    d. Soprema Lastobond Shield HT
    e. Grace Ice & Watershield HT

B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch (2400-mm) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot (3-m) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements.

G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: Silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using factory set, non-adjustable, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

D. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.0013 mm) over 0.2± 0.05 mil (0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.

    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 36 inches (914.4 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days or as directed by the underlayment product manufacturer.

1. Apply over the entire roof surface.

B. Felt Underlayment: Apply at locations indicated below, in shingle fashion to shed water, and with lapped joints of not less than 2 inches (50 mm).

1. Apply over the entire roof surface.

C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels to be level to 1/4 inch in 20 ft. (6 mm in 6.1 m).
2. Flash and seal metal panels at perimeter of all openings. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Locate and space fastenings in uniform vertical and horizontal alignment.
4. Install flashing and trim as metal panel work proceeds.
5. Panels should be continuous without end laps.
6. Align bottoms of metal panels and fasten.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use stainless-steel fasteners for surfaces exposed to the interior.

C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates, if required, at locations indicated in manufacturer's written installation instructions.
3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel are completely engaged.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Connect downspouts to underground drainage system indicated.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.

B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13

SECTION 07 62 00 ROOF RELATED SHEET METAL

PART I – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

A. It is the intent of this Section that the Work shall:
   1. Conform to all applicable building code requirements and of authorities having jurisdiction.
   2. Include all shop and field formed sheet metal work shown on drawings, specified or required, including, but not limited to:
      a. Roof penetration sleeves and hood and umbrella counterflashing
      b. Metal counterflashing
      c. Metal Receivers
      d. Expansion joint
      e. Metal perimeter edge
      f. Gutters, Downspouts, Splash Blocks and Splash Pans
      g. Copings, trim and miscellaneous sheet metal accessories.
   3. Be part of the Work of the Metal Roofing System; and
   4. Be performed by a single source contractor.

1.3 REFERENCES

A. ASTM International (ASTM)
   1. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   2. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   3. B32, Standard Specification for Solder Metal
   4. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

B. ASCE 7 – 16: Minimum Design Loads and Associated Criteria for Buildings and other Structures.

C. Federal Specifications (FS)
   1. QQ-L-201 for lead

D. National Association of Architectural Metal Manufacturers (NAAMM)

E. National Roofing Contractors Association (NRCA)
   1. Roofing and Waterproofing Manual

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. Architectural Sheet Metal Manual

G. ANSI / SPRI ES-1: Wind Design Standard for Edge Systems used with Low-Slope Roofing Systems.

1.4 SUBMITTALS

A. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
2. Manufacturer's installation instructions.

B. Shop Drawings: Indicating sizes, configurations, details of attachment to related and adjacent work, materials, and finishes.

C. Samples:
1) Full range of finish colors for Architect's selection.
2) 12-inch-long sample of each specified item with approved finish.
3) Provide full size mockup of all shop-built assemblies.
4) Documentation of Wind uplift requirements for Roof Edge for specific project location
a. Wind Calculator available online

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator and installer of roof-related flashing, installer of prefabricated edge metal and accessories shall be the same as the membrane roof installer.

B. Comply with governing codes and regulations of authorities having jurisdiction.

C. ANSI / SPRI ES-1: Install sheet metal edge flashings and copings to comply with requirements of ANSI / SPRI ES-1 / FM 1-49 for minimum of up to 146 wind speed zone and wind resistance loads per structural drawings.

1.6 INSTALLATION CONFERENCE

A. Refer to Section 01 31 13, Project Coordination.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, handle and store materials in accordance with manufacturer's instructions.

B. Handle and store materials and equipment in such a manner as to avoid damage.

C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

1.8 WARRANTIES

A. Manufacturer's Product Warranty:
1) Manufacturer's standard 30-year Kynar 500 or Hylar 5000 Finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
2) Failure is defined to include, but not be limited to:
a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
3) Wind Warranty
a. 120 MPH Blow Off Resistance, 20 Year

4) Correction may include repair or replacement of failed product as outlined in Warranty Documents
5) Finish warranty and wind warranty shall be delivered by Roofing Contractor to Owner at the conclusion of project as part of project closeout documents.

B. Roofing Contractor's Warranty:
1. Contractor shall warrant the installation and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight and secure, for a period of five (5) years from date of Substantial Completion.
2. Defects shall include, but not be limited to:
a. Leaking water on the exterior of the building, causing staining or discoloration of wall / exterior surface.
b. Leaking water or bitumen within building or construction.
c. Becoming loose from substrate / blocking.
d. Loose or missing parts.
e. Finish failure as defined above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Metal Era, Inc.1600 Airport Rd.; Waukesha, WI 53188; Toll Free Tel: 800-558-2162; Email: request info (info@metalera.com);

B. Approved Substitutions:
1. Imetco Metals; 4648 South Old Peachtree Rd. Norcross, GA 30071; Toll Free 800-646-3826
2. Atas International; 6612 Snowdrift Rd. Allentown, PA 18106; Toll Free 800-468-1441

C. Manufacturers named within specification are approved for use on the Project providing:
1. their products meet or exceed the specifications.
2. company has a minimum of five (5) years' experience manufacturing products of the type specified.
3. products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system; and
4. products are approved for use by the roofing membrane manufacturer.

2.2 SHEET METAL MATERIALS

A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.

B. Prefinished Galvanized Steel Sheet:
1. Precoated type, galvanized steel conforming to Fed. Spec. QQ-A-250, ASTM B209.
2. Finish: Kynar 500, color as selected by Architect from manufacturer's full range of colors.
3. Thickness: Minimum 0.040 inch, except as otherwise indicated.
4. Acceptable Products:
a. Berridge Manufacturing Company
b. Pac-Clad

C. Sheet Lead:
1. Comply with FS QQ-L-201, Grade B
a. Four (4) pound minimum for use at roof drains and soil stacks.

D. Stainless Steel: ASTM A167, Type 302 / 304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

2.3 FASTENERS

A. Same metal as flashing / sheet metal or other non-corrosive metal or as noted below.

B. Exposed fasteners shall be self-sealing and gasketed (ZAC type) for weathertight installation.

C. Match finish of exposed heads with material being fastened.

D. Mechanical Fasteners:
1. Nails: Ring shank, minimum 1-1/2 inches in length with 1/2-inch diameter head.
2. Washers: Steel washers with bonded rubber sealing gasket.
3. Screws: Self-tapping sheet metal type of stainless steel or compatible with material being fastened, with hooded integral EPDM washers (ZAC type).
4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.

E. Clips:
1. Cleat (coping / fascia): G-90 galvanized, stainless steel, or aluminum. Match material of coping / fascia and provide one (1) gauge heavier.

2.4 RELATED MATERIALS

A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.

B. Flux:
1. Phosphoric acid type, manufacturer's standard.
a. For Use with Steel or Copper: Rosin flux
b. For Use with Stainless Steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Underlayment:
1. At expansion joints: to be used as bellow; 48 mil minimum, non-reinforced, homogeneous, waterproof, impermeable elastomeric sheeting manufactured by Nervastral, Inc. or Lexsuco.
2. At wood blockings: Self-Adhered Flexible Flashing: 40-mil, rubberized asphalt adhesive reinforced flashing with a high density cross laminated polyethylene film. Provide compatible substrate primer as instructed by manufacturer and coordinate with specification 07 65 00.

D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, size and gauge recommended by installer to suit application and performance.

F. Sealant:
   1. Type A:
      a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
      b. Approved Products / Manufacturers: “Chem-Calk 900” manufactured by Bostik Construction Products Division, “Vulkem 921” manufactured by Mameco International, Inc., “Dynatrol I” manufactured by Pecora Corporation, “MasterSeal NP 1” manufactured by BASF, or approved equal.
   2. Type B:
      a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
      b. Approved Products / Manufacturers: “Chem-Calk 1200” manufactured by Bostik Construction Products Division, ”795 Silicone Building Sealant” manufactured by Dow Corning Corporation, “895 Silicone” manufactured by Pecora Corporation, “Omniseal” manufactured by Sonneborn Building Products, “Spectrem 2” manufactured by Tremco Incorporated, or approved equal.

G. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five (5) percent air entrainment. Use at locations where roof drainage discharges on ground.

2.5 FABRICATION

A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers, and counterflashing’s in accordance with standards set forth in the NRCA roofing manual and SMACNA.

B. Comply with manufacturer's installation instructions and recommendations.

C. Shop fabricate Thru-wall, counterflashing’s, expansion joint metal and wind clips to greatest extent possible.

D. Fabricate items to size and dimensions as indicated on the drawings. Limit single-piece lengths to twelve (12) feet for prefabricated pieces and ten (10) feet for shop fabricated pieces.

E. Face of any fabricated vertical metal fascia or coping shall not exceed 8” without stiffener band or bird’s beak. If stiffener band or bird’s beak cannot be fabricated, contractor to use multiple pieces of metal to achieve overall distance without going over the 8” maximum per piece.

F. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of the work.

G. Integrate flashing in a manner consistent with membrane waterproofing detailing. Form work to fit substrates.

H. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

I. Fabricated items will have straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

J. Fold back edges on concealed side of exposed edge to form hem.

K. Unless noted otherwise, lap joints minimum three (3) inch. Lap joints to have sealant installed as per details, to maintain watertight condition.

L. Inside and outside corners and elevation changes to be riveted and soldered. At the conditions provide fabricate piece with 12” legs in each direction.

M. Seams:
1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets and silicone sealant.
3. Metal Other than Aluminum and Pre-finished Metal: Tin edges to be seamed, form seams, and solder.

N. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

O. Backpaint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

P. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one (1) inch deep filled with mastic sealant concealed within joints.

2.6 FABRICATED ITEMS

A. Metal Flashings:
1. Through Wall Receiver Tray: Minimum 24-gauge stainless steel formed in maximum ten (10) foot lengths, through wall receivers shall not extend past the face of the exterior veneer more than ¾”.
2. Counterflashing’s: Minimum .040 glavanized steel, formed in maximum ten (10) foot lengths.

B. Wind Clips: (match material of counterflashing), one (1) inch wide by length to engage counterflashing a minimum of 1/2 inch. To be installed at all wall flashings and at curb flashing lengths longer than 5 feet.

C. Metal Coping
1. Perma-Tite Gold Coping Tapered
Construction:
a) Metal:
1) .040-inch (1.01 mm) aluminum.
b) Finish:
1) Kynar-500 color as selected by the Architect from roof edge manufacturer's full range of colors.
2) Coping Cap: Length of 12’-0”, widths to 24” manufactured to job requirements. True radii may be built to template.
3) Coping Vertical Face and Back Leg: 2 ¼” to 12 ½” manufactured to job requirements.
4) Concealed Splice Plates: 8” wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.
5) Anchor / Support Cleat: 20-gauge pre-punched galvanized cleat with

stainless steel spring mechanically locked to cleat normally 12" wide at 4'-0" on center. Mechanically fastened as indicated and detailed.

6) Fasteners: 1 ½" stainless steel with driver.

7) Performance:
   a) 20 Year, 120 mph Wind Warranty
   b) Tested per ANSI / SPRI ES-1 Standard to comply with the International Building Code.
   c) Miami-Dade Approved (No. 13-0419.03 12/11/18) to comply with the "High Velocity Hurricane Zone of the Florida Building Code".

D. Continuous Cleats (where applicable): Continuous strips, same material and profile, minimum one gauge heavier of item which cleats attach.

E. Angle Termination Bar: Aluminum pressure bar 1/8-inch x one (1) inch.

F. Gutters / Downspouts / Collector Heads: Seal-Tite Industrial Gutter System by manufacturer.
1. Minimum 0.050-inch-thick pre-finished Galvanized Steel, formed in maximum twelve (12) foot lengths.
2. Verify gutter and downspout meets rainfall data as outlined in SMACNA.
3. Seal-Tite Industrial Gutter, including 2" Wide Gutter Straps 24" o.c., Wind Straps 6'-0" o.c.,1/8" Stainless Steel Pop Rivets, and #10 x 2" Stainless Steel Fasteners to be manufactured and supplied to suit profile and dimension of gutter and downspout by manufacturer.
4. Include One Drip Edge without Continuous Cleat.
5. .040" Aluminum, color to match gutter.
6. End Caps, Downspout Outlets, Gutter and Downspout Straps, Support Brackets and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
7. Install all anchoring devices as outlined in manufacturer literature.
8. Expansion Joints: Style 1 per manufacturer, locate every 50 linear feet.
9. Gutter Straps and Supports: Minimum 3 .100-inch-thick Downspout straps: Strap type, like metal, match color.
10. Downspout straps: Strap type, like metal, match color.
11. Gutter Screen: .050" Aluminum with ¼" dia. perforations
12. Collect Heads: Minimum 0.040-inch thick pre-finished (match color) pre-finished galv. steel. As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrates are smooth and clean to extent required to perform sheet metal work.

B. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set in place.

C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

D. Do not start work until conditions are satisfactory.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication work.

B. Install starter and edge strips and cleats before starting installation.

3.3 INSTALLATION

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4-inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three (3) feet from actual corner. Laps shall be one (1) inch, riveted and soldered at following locations:
1. Pre-fabricated corners;
2. transitions;
3. changes in direction, elevation, and plane; and
4. at intersections.

B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams which are permanently watertight and weatherproof.

C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations as well as with SMACNA Architectural Sheet Metal Manual.
1. Ensure approved fasteners are used throughout the project.
2. Ensure fasteners are installed in manufacturer pre-punched holes on rails, extrusions, clips and cleats.
3. Ensure sufficient amount of waterblock is applied where appropriate to prevent leaking under rails/extrusions. **Contractor is responsible for cleaning stained brick and remedying for total length of workmanship warranty if waterblock is not installed appropriately.**

D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials which are incompatible with roofing system.

E. Cleat: At exposed edges of perimeter edge, fascia's, cap flashings, and where required, attach cleat with appropriate fasteners supplied by roof edge manufacturer. Install cleat so fascia extends a minimum of 1 inch below top of exterior wall finish.

F. Counterflashing:
1. Do not use surface mount counterflashing except as noted in drawings.
2. Set in through wall with receiver and spring lock counterflashing, as detailed in drawings and to NRCA roofing manual, SMACNA standards.
3. Coordinate installation of through-wall flashing with the masonry contractor.
4. Seal through-wall in conjunction with masonry wall waterproofing.
5. Install wind clips 30 inches o.c. at all counterflashing over five (5) feet in length.

G. Gutters / Downspouts:
1. Install gutters as detailed.
2. Install downspouts plumb and level, attached to columns or wall with straps located at top and bottom of downspout and maximum ten (3) feet on center (note: 3 per 12' lengths supplied by manufacturer.
3. Install splash pad or block under discharge port of downspouts (if not exist). Install splash pan over a protection (walkway) pad for downspouts located at roof level.
4. End Caps, Downspout Outlets, Gutter and Downspout Straps, Support Brackets and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
5. Install all anchoring devices as outlined in SMACNA.
6. Expansion Joints: Lap or Butt type per SMACNA, locate every 50 linear feet.

L. Coping:
1. Install wood nailers as shown on drawings.
2. Install metal cleats with appropriate fasteners spaced per manufacturers requirements to meet design pressures.
3. Install underlayment over the wood substrate. Lap ends minimum of six (6) inches and secure membrane in place. Seal laps with appropriate adhesive.
4. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four (4) inches. Fasten cover plate on one (1) side of joint only. (Provide wall flashing membrane up and over parapet wall in accordance with manufacturer's detail.)

3.4 CLEANING AND PROTECTION

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

B. Remove scraps and debris and leave work area clean.

C. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

E. Paint metal flashings that have been soiled with bitumen with aluminized paint.

F. Clean other work damaged or soiled by Work of this Section.

G. Protect finished work from damage.

END OF SECTION

SECTION 07 65 26 MEMBRANE THROUGH-WALL FLASHING

PART 1 - GENERAL

1.1 SCOPE

A. Furnish and install all thru-wall flashing with metal drip at all exterior walls to create a complete watertight exterior wall system.

B. Through-wall flashing and accessories for installation in cavity wall construction in the following locations:
1. Wall bases
2. Window sills
3. Heads of openings
4. Shelf angles / lintel angles
5. Tops of walls
6. Parapets
7. Above wall projections such as windows, canopies, ladders, etc.
8. At other discontinuities in the cavity

1.2 MISCELLANEOUS REQUIREMENTS

A. Installer: The installer of the flashing specified in this section shall be the installer of the associated materials for undivided responsibility.

B. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

1.3 REFERENCES

A. ASTM D 146 Standard Test Methods for Sampling and Testing Bitumen Saturated Felts and Woven Fabrics for Roofing and Waterproofing

B. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension

C. ASTM D 570 Standard Test Method for Water Absorption of Plastics

D. ASTM D 903 Standard Test Method for Peel and Stripping Strength of Adhesive Bonds

E. ASTM D 1876 Standard Test Method for Peel Resistance of Adhesive

F. ASTM D 4263 Standard Test Method for Indicating Moisture Content by Plastic sheet Method

G. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

H. ASTM E 154 Standard Test Methods for Water Vapor Retarders used in Contact with Earth under Concrete Slabs, on Walls or as Ground Cover

1.4 SUBMITTALS

A. Provide submittals in accordance with Section 01 33 00

B. Shop drawings showing locations of through-wall flashing and details of all typical conditions.

C. Manufacturer's technical data sheets and material safety data sheets for Product and Accessories.

D. Manufacturer's installation instructions.

E. Manufacturers documentation of volatile organic compounds (VOC) content for Product and Accessories.

F. Certification of compatibility by Manufacturer, listing all materials on the Project with which the Product and Accessories may come into contact.

G. Samples of Product minimum 12 inch by 12 inch size.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single Source Responsibility: Obtain Product and Accessories from single manufacturer.

C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

D. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed Product unless it has been inspected, tested and approved.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by Manufacturer.

C. Protect stored materials from direct sunlight. Do not store cylinders of Aerosol Contact Adhesive above 110 degrees F.

D. Avoid spillage. Immediately notify Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

1.7 WASTE MANAGEMENT AND DISPOSAL

A. Separate and recycle waste materials in accordance with Construction Waste Management and Disposal, and with the Waste Reduction Work Plan.

B. Place materials defined as hazardous or toxic waste in designated containers.

C. Ensure emptied containers are stored safely for disposal away from children.

1.8 PROJECT CONDITIONS

A. Do not apply during rain or accumulating snowfall.

B. Apply at ambient temperatures above 40 degrees F unless procedure for low temperature application is followed. Do not apply during rain.

C. Low Temperature Application: Use Low-Temp Product. Store in heated area until use. Apply at ambient temperatures above 25 degrees F.

D. Contact Adhesives: Maintain cylinders of Aerosol Spray Contact Adhesive above 60 degrees F during spray. Do not apply Water-Based Contact Adhesive at ambient temperatures below 40 degrees F.

1.9 WARRANTY

A. Provide the Manufacturers minimum five year material warranty under provisions of Warranties Section.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Manufacturers listed whose product meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.
1. W.R. Grace Const. Products - "Perm-A-Barrier" 40 mil wall flashing
2. W.R. Meadows - "Air Shield" - 40 mil
3. MFM Building Products. - "MFM Subseal - 40"
4. Tamko Building Products - "Tamko TW Flash-N-Wrap - 40"
5. Polyguard Products, Inc. - "Polyguard 400"
6. Carlisle Coatings & Waterproofing - CCW-705-TWF, 40 mil thru wall flashing
7. Henry Co. - "Blueskin TWF" - 40 mil
8. Ortifiber Building System - "FortiFlash 40 mil"
9. Sandell Construction Solutions - Sando-Seal 40 mil"
10. Substitution products shall conform to requirements of membrane flashing listed below.

2.2 MEMBRANE FLASHING

A. Elastic Sheet Flashing/Membrane: Composite, self-adhering, rubberized asphalt membrane laminated to a high density polyethylene film consisting of minimum 40 mils thickness and complying with the following:
1. Thickness: min. 40 mil
2. Tensil Strength (ASTM D412): not less than 900 psi
3. Ultimate elongation (ASTM D412): 200%.
4. Low temperature flexibility (ASTM D 746): -30°F
5. Pliability (ASTM D146): pass @ -25° F, ¼" mandrel
6. Peel Adhesion (ASTM D-903): 5 lbs./in. min.
7. Puncture Resistance (ASTM E-154): 40 lbs. min.
8. Resistance to ozone aging (ASTM D 1149): no cracks for 10% elongated sample for 100 hours in 50 pphm (50.5 mPa) ozone at 104°F.
9. Resistance to Heat Aging (ASTM D573): Maximum hardness increase of 15 points, elongation reduction of 40%, and tensile strength reduction of 30% or 70 hours at 212°F.

2.3 MISCELLANEOUS MATERIALS

A. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet. Verify compatibility of adhesive with manufacturer of material for which flashing/adhesive is being applied to.

B. Primer, Mastic, Fill Compound: Type recommended by flashing sheet manufacturer and compatible with substrate.

C. Termination Bar: Provide metal (304 Stainless Steel) termination bar with sealant flange at top of flashing to support and maintain flashing installation free of “fish mouths.” Completely seal termination bar with sealant along top edge and at all fastener penetrations. Plastic or composite termination bars shall not be acceptable. Acceptable product is T2 – Termination Bar as manufactured by Hohmann & Barnard, Inc. or equivalent.

D. Metal Drip Edge: Provide metal drip edge as specified in specification Section 04 20 00 – Unit Masonry.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions affecting installation of the through-wall flashing and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Concrete shall be cured for a minimum of seven days.

C. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

D. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

E. Notify Architect in writing of anticipated problems applying Product over substrate.

3.2 SURFACE PREPARATION

A. Fill joints and cracks greater than 1/4 inch width with Fill Compound struck flush.

B. Fill inside corners and angle changes with minimum 1/2 inch tooled bead of Fill Compound.

3.3 INSTALLATION OF MEMBRANE FLASHING

A. Allow fill compound used to cure fully before applying product.

B. Coordinate installation of metal drip edge at all masonry flashing locations.

C. Apply product to sound substrate. Do not apply over mechanically-attached water resistive barrier such as felt, paper or house wrap.

D. Apply Contact Adhesive to substrate. Apply thin, continuous coating at coverage rate indicated on technical data sheet. Allow to dry until it does not transfer when touched, but still has tack. Re-apply to surfaces that have become dusty or lost tack.

E. Apply Product over surface the same day of application of Contact Adhesive.

F. Cut manageable length pieces of Product from roll. Position, remove release liner and press to substrate with hand pressure. Avoid trapping air and forming wrinkles

G. Lap adjacent pieces 6 inches minimum. Wipe film surface with clean towel to assure good adhesion of laps.

H. Cut and fit around penetrations such as imbedded masonry ties.

I. Cut and fit to cover inside and outside corners

J. Turn up ends at discontinuities 1 inch minimum to form end dams.

K. Roll firmly to substrate with hand roller tool. Roll laps firmly in perpendicular direction to terminating edge.

L. Seal end laps, cut edges and around penetrations with Mastic.

M. Product shall extend vertically up the back-up wall 8 inches minimum.

N. Keep Product minimum 1/2 inch from finished exterior. Keep edge from contacting visible sealant.

O. Terminate Product onto metal drip edge protruding to exterior.

P. Anchor and seal vertical termination on back-up wall with one of the following methods:
1. Secure with Termination Bar fastened to substrate. Seal Termination Bar to substrate with Mastic.
2. Build into unit masonry back-up wall. Product shall extend into wall 2 inches minimum

Q. General: Through-wall, flexible membrane flashing shall be installed at heights, conditions, locations as drawings indicate to manufacturer's current recommendations and as called out in this section.

R. Protect the material from tears and punctures during operations. Apply material to clean, ice free, dry substrate. Do not apply primer or membrane to frozen substrates.

S. Do not install membrane at temperatures below 40°F.

T. Do not apply primer or membrane to damp or contaminated surfaces.

U. Remove foreign matter, rubbish, debris. Fill holes, joints, cracks and point flush with projections. Do not leave flashing in place unprotected from ultraviolet deterioration for more than two days. In cold weather, store adhesives at 70° for 24 hours before use. Flashing not to be penetrated except as shown for nailing. Flashing to be turned down minimum 2" on roof side of curb and extend down to within 1/2" of bottom of sheet metal or to cover the existing flexible flashing by 2", as the case may be. Use adhesives at attachment points and laps. Install turned up (end dams) at all masonry sills and lintels minimum 2" and extend to within 1/2" of exterior wall. No shapes to be constructed that would trap water. Flashing to have waterproofing integrity and shaped so as to shed water to exterior wall weep holes. At re-entry wall conditions, special attention shall be given to provide continuous coverage without gaps to deliver water from wall cavity to exterior face of finish wall.

V. Bonding Flashing to Building Elements: Apply primer for self-adhering membrane as recommended by manufacturer or brush adhesive on building elements used as substrates for non-self-adhering flashing. Allow to become tacky, then apply and press the membrane into adhesive; laps to be minimum 6".

W. Bonding Flashing to Flashing: Lap flashing minimum 6". Apply a continuous coat of adhesive to both surfaces of flashing. Allow adhesive to air dry until it no longer transfers to the finger when touched. Work flashing from one edge of the joint to the other and press flashing firmly together. Avoid air entrapment or excessive use of adhesive.

X. Location: Provide through-wall flashings at all locations necessary to provide waterproofing integrity. This includes window penetrations.

Y. Masonry Mount Reglet: Shall be installed prior to through-wall flashing. Set into a thin layer of fresh mortar followed by through-wall flashing. Follow corner and other drawings as shown and as recommended by Fry. Masonry mount reglet not to bridge expansion joint, control joint. Provide cover part at these locations.

Z. Weep Holes: Provide ventilators-weep holes 24" o.c. immediately above through-wall flashing on exterior walls.

END OF SECTION 07 65 26

SECTION 07 90 00 BUILDING SEALANTS AND CAULKING

PART 1 GENERAL

1.1 SUMMARY

A. Extent of each form and type of joint sealer is indicated below and supplemental information shall be found on the drawings.

B. Section includes sealers for the following exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:
1. Control and expansion joints in cast-in-place concrete.
2. Control and expansion joints in pre-cast concrete.
3. Control and expansion joints in unit masonry.
4. Joints between different materials listed above.
5. Perimeter joints between materials listed above and frames of doors and windows.
6. Control and expansion joints in ceiling and overhead surfaces.
7. Other joints as indicated.

C. Section includes sealers for exterior joints in horizontal traffic surfaces as indicated below:
1. Control, expansion, and isolation joints in cast-in-place concrete slabs for floors and paving.
2. Joints between different materials listed above.
3. Other joints as indicated.

D. Section includes sealers for interior joints in vertical surfaces and horizontal non-traffic surfaces as indicated below:
1. Control and expansion joints on exposed interior surfaces of exterior walls.
2. Perimeter joints of exterior openings.
3. Joints between tops of non-load-bearing unit masonry walls and underside of structural deck and beams.
4. Tile control and expansion joints.
5. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
6. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
7. Perimeter joints of toilet fixtures.
8. Other joints as indicated.

E. Sealing joints and penetrations for firestopping is specified in Division 7, Section 07 84 00 - Firestopping for through-penetration firestopping systems.

F. Sealing joints related to flashing and sheet metal for roofing is specified in Division 7, Section 07 62 00 - Sheet Metal Flashing, Trim, and Accessories.

G. Sealants for glazing purposes are specified in Division 8, Section 08 80 00 - Glass and Glazing.

H. Sealing tile joints is specified in Division 9, Section 09 31 00 - Ceramic and Quarry Tile.

1.2 REFERENCE STANDARDS

A. All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following:

1. Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168.
2. Aerosol Adhesive shall comply with Green Seal Standard for Commercial Adhesives GS-36 requirements.

1.3 SYSTEM PERFORMANCE

A. Provide joints sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.4 SUBMITTALS

A. Product Data from manufacturer's for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of exposed to view strips of actual products showing full range of colors available, for each product exposed to view.

C. Samples for verification purposes of each type and color of joint sealer required. Install joint sealer samples in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealers.

D. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

E. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project name, addresses, names of Architects and Owners, plus other information specified.

F. Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer who has successfully completed, within the last 3 years, at least 3 joint sealer applications similar in type and size to that of this Project.

B. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

C. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division-1 section covering this activity.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi-component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
   1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F.
   2. When joint substrates are wet due to rain, frost, condensation or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

1.8 SEQUENCING AND SCHEDULING

A. Sequence installation of joint sealers to occur not less than 21 nor more than 30 days after completion of waterproofing, unless otherwise indicated.

1.9 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

C. Warranty Period: Two years from date of Substantial Completion.

D. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing 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.

E. Warranty Period: 5 years from date of Substantial Completion.

F. 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

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealers, joint fillers 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: Provide color of exposed joint sealer as selected by Architect from manufacturer's full

range of colors.

2.2 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class and Uses.
   1. Acceptable Manufacturers
      a. BASF Building Systems.
      b. Dow Corning Corporation.
      c. GE Advanced Materials.
      d. Sika Corporation, Construction Products Division
      e. Tremco

B. One-Part Mildew-Resistant Silicone Sealant: 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 joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.
   1. Application: Interior vertical and non-traffic horizontal joints in wet areas (e.g. showers, kitchens, perimeter joints of toilet fixtures).

   2. Available Products:
      a. "Dow-Corning 786"; Dow Corning Corp. www.dowcorning.com
      b. "SCS 1700 Sanitary"; General Electric Co. www.gesealants.com

C. One-Part Nonsag Urethane Sealant for Use NT: Type S; Grade NS; Class 25; and Uses NT,M, A, and, as applicable to joint substrates indicated, O;
   1. Application: Exterior joints in vertical surfaces and non-traffic horizontal surfaces as indicated below:
      a. Control and expansion joints in cast-in-place concrete.
      b. Control and expansion Joints in unit masonry.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors and windows.
      e. Control and expansion joints in ceiling and overhead surfaces.
      f. Other joints as indicated.
   2. Available Products:
      a. "Sikaflex-1a"; Sika Corp. www.sika.com
      b. "Sikaflex-15LM"; Sika Corp. www.sika.com

D. One-Part Nonsag Urethane Sealant for Use T: Type S; Grade NS; Class 25, and complying with the following requirements for Uses:
   1. Uses T, NT, A, and, as applicable to joint substrates indicated, O.
   2. Application: Exterior horizontal joints subject to vehicular and pedestrian traffic. Interior horizontal joints subject to vehicular and pedestrian traffic and not indicated to receive expansion control assemblies.
   3. Available Products:
      a. "Sikaflex-1a"; Sika Corp. www.sika.com
      b. "Sikaflex-15LM";Sika Corp. www.sika.com

E. Pourable Urethane Sealant for Use T (at exterior paving): Type S; Grade P; Class 25, and complying with the following requirements for Uses:
   1. Uses T, A, and, as applicable to joint substrates indicated, O.
   2. Application: Exterior horizontal joints subject to vehicular and pedestrian traffic.
   3. Available Products:
      a. "Vulkem 45, Vulkem 45SSL"; Tremco, Inc. www.tremcosealants.com
      b. "NR-201 Urexpan"; Pecora Corp. www.pecora.com

c. "SL 1"; Sonneborn; www.master-builders-solutions.com

2.3 LATEX JOINT SEALANTS

A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, acrylic, mildew-resistant, acrylic-emulsion sealant complying with ASTM C 834, formulated to be painted and recommended for exposed applications on interior and on protected exterior locations involving joint movement of not more than plus or minus 5 percent.

1. Application: Interior joints in vertical surfaces and horizontal non-traffic surfaces as indicated below:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints of exterior openings.
   c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
   d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
   e. Other joints as indicated.
2. Available Products:
   a. "Chem-Calk 600"; Bostik Construction Products Div, www.bostik.com
   b. "Sonolac"; Sonneborn; www.master-builders-solutions.com
   c. "Tremflex 834"; Tremco Inc. www.tremcosealants.com

2.4 MISCELLANEOUS JOINT SEALANTS

A. Acoustical Sealant for Concealed Joints: Manufacturer's standard, nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

1. Available Products:
   a. "Tremco Acoustical Sealant"; Tremco Inc. www.tremcosealants.com

2.5 COMPRESSION SEALS

A. Preformed Foam Sealant: Manufacturer's standard preformed, precompressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellant agent; factory-produced in precompressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:

1. Properties: Permanently elastic, mildew-resistant, non-migratory, non-staining, compatible with joint substrates and other joint sealers.
   a. Impregnating Agent; Manufacturer's standard.
   b. Density: Manufacturer's standard.

2. Backing: Where required, provide backings suitable for intended use, compatible with joint substrates and other joint sealers, designed to work in conjunction with primary sealants in dual- sealant systems.

3. Available Products:
   a. "Emseal"; Emseal Corp. www.emseal.com
   b. "Emseal Greyflex"; Emseal Corp. www.emseal.com
   c. "Polytite R"; Polytite Manufacturing Co., Inc. www.polytite.com
   d. "Polytite Standard"; Polytite Manufacturing Co., Inc. www.polytite.com
   e. 'Will-Seal 150"; Will-Seal Construction Foams Div.
   f. "Will-Seal 250"; Will-Seal Construction Foams Div.
   g. "York-Seal 100"; York Manufacturing, Inc. www.yorkflashings.com
   h. "York-Seal 200"; York Manufacturing, Inc. www.Vorkflashings.com

B. Preformed Hollow Neoprene Gasket: Manufacturer's standard preformed polychlorophene elastomeric joint seal of the open-cell compression type complying with ASTM D 2628 and with requirements indicated for size, profile and cross-sectional design.
   1. Available Manufacturers:
      a. Watson-Bowman & Acme Corp. www.watsonbowman.com
      b. The D.S. Brown Co. www.dsbrown.com

2.6 JOINT SEALANT BACKING

A. General: Provide sealant backings of material and type which are non-staining; 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. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non-waxing, non-extruding strips of flexible, non-gassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
   1. Install only closed-cell or dual-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.

C. Elastomeric Tubing Joint-Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F (-15 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape as 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.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturer of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.

C. Masking Tape: Provide non-staining, non-absorbent type compatible with joint sealants and to surfaces adjacent to joints.

2.8 JOINT FILLERS FOR CONCRETE PAVING

A. General: Provide joint fillers of thickness and widths indicated.
   1. Bituminous Fiber Joint Filler: Preformed strips of composition below, complying with ASTM D 1751:
      a. Asphalt saturated fiberboard - “Fiber Board”, APS Cork Co. or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
   1 Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt and frost.
   2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
   3. Remove laitance and form release agents from concrete.
   4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer 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 which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALERS

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

D. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.

E. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
   1. Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.
   2. Do not leave gaps between ends of joint-fillers.
   3. Do not stretch, twist, puncture or tear joint fillers.
   4. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.
   5. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

F. Install compressible seals serving as sealant backings to comply with requirements indicated above for joint fillers.

G. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

H. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
   1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.
   2. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.
   3. Use masking tape to protect adjacent surfaces of recessed tooled joints.
   4. Provide Recessed joint configuration per Figure 6C in ASTM C 962, of recess depth and at locations indicated.

I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrappings, taking care not to pull or stretch material, and complying with sealant manufacturer's directions for installation methods, materials and tools which produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's recommendations.

J. Installation of Preformed Hollow Neoprene Gaskets: Install gaskets, with minimum number of end joints, in joint recesses with edges free of spalls and sides straight and parallel, both within tolerances specified by gasket manufacturer. Apply manufacturer's recommended adhesive to joint substrates immediately prior to installing gaskets. For straight sections provide gaskets in continuous lengths; where changes in direction occur, adhesively splice gaskets together to provide watertight joint. Recess gasket below adjoining joint surfaces by 1/8 inch to 1/4 inch.

3.4 CLEANING

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

3.5 PROTECTION

A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

END OF SECTION 07 90 00

SECTION 08 33 14 ROLLING SHEET DOORS

PART 1 GENERAL

1.1 SUMMARY
- A. Section Includes: Manual rolling sheet doors.

1.2 SYSTEM DESCRIPTION
- A. Type: Continuous sheet rolling door. Mount as indicated in the drawings

1.3 SUBMITTALS
- A. Submit the following items:
  1. Product Data
  2. Shop Drawings
  3. Quality Assurance/Control Submittals:
     - a. Provide proof of manufacturer and installer qualifications - see 1.4 below
     - c. Provide manufacturer's installation instructions

1.4 QUALITY ASSURANCE
- A. Qualifications:
  1. Manufacturer Qualifications: A minimum of five years' experience in producing doors of the type specified
  2. Installer Qualifications: Manufacturer's approval

1.5 DELIVERY STORAGE AND HANDLING
- A. Follow manufacturer's instructions

1.6 WARRANTY
- A. Standard Warranty: Three years from date of shipment against defects in material and workmanship.
- B. Maintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products.

PART 2 PRODUCTS

2.1 MANUFACTURER
- A. Clopay Building Products – Basis of Design
- B. Cookson
- C. Over Head Door Company

2.2 PRODUCT INFORMATION
- A. Model: 160C by Clopay Building Products

2.3 MATERIALS
- A. Curtain:
  1. Sheets: Continuous 20" corrugated sheets roll formed from 26 gauge ASTM A653 Grade 80 full hard steel and lock seamed together.
  2. Finish: galvanized and pre-painted with long-lasting silicone polyester paint guaranteed with a 25 year film integrity warranty to not crack, peel or blister. Additional guarantee up to 20 years against chalking and fading based on color chosen.
  3. Bottom Bar: Roll formed clear acrylic coated galvanized steel reinforced with a 2" x 1-1/2" x 12 gauge galvanized angle that extends fully into the guides.
  4. 1-1/2" wide nylon strips attached on the edge of each end of both the front and back of the curtain to control stretch and reduce wear.

B. Weatherstripping
1. Black PVC bulb-type astragal affixed to the bottom bar assembly provides positive contact with the floor.

C. BARREL ASSEMBLY
1. Galvanized coil steel fabricated in a 12” diameter spiral formation to enclose spring counterbalance system and provide full span curtain weight support. Attached galvanized drums are furnished with grease-filled, shielded radial ball bearings at rotating points around the axle.

D. SPRING COUNTERBALANCE
1. Factory lubricated, oil tempered, helical torsion springs located inside the barrel made of wire conforming to ASTM A229. Springs are attached to the steel axle tube by means of a welded spring clip. Axle tube provided is sufficient size to carry curtain load and spring torque. Spring cycle life of 15,000.

E. SUPPORT BRACKETS
1. Galvanized and reinforced 12 gauge formed steel brackets.

F. SPRING TENSIONER
1. External mounted cam action tension retaining device allows for field adjustment of spring tension on all springs.

G. GUIDE ASSEMBLY
1. Universal mounted guides rolled formed from 12 gauge galvanized steel. 3” guide depth furnished for sufficient curtain engagement. Removable galvanized door stop at top of each guide.

H. OPERATION
1. Hand operated with #6 Angola rope on size up to 10’0” x 10’0” attaching to the bottom bar assembly.

2. Universal 5.7:1 cast iron reduced drive hand operated chain hoist furnished for all doors over 10’0” wide or 10’0” tall.

I. LOCKING MECHANISM
1. Dual steel bottom bar slide locks suitable for pad locks (provided by others) mount to the inside angle of the bottom bar. Chain operation not required.

J. HOOD
1. Fabricated from 20 gauge steel and reinforced with end caps and roll formed edges. Manufactured square.

K. FINISH:
1. Non-galvanized surfaces, excluding axle tube, to consist of shop coat of rust inhibitor primer.

PART 3 EXECUTION

3.1 EXAMINATION
A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings
B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates
C. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION
A. Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports
B. Follow manufacturer's installation instructions

3.3 ADJUSTING

A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion

3.4 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer

B. Remove surplus materials and debris from the site

3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative

B. Instruct Owner's Representative in maintenance procedures

END OF SECTION

SECTION 08 91 10 METAL WALL LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fixed stationary blade, extruded aluminum wall louvers.

1.2 DEFINITIONS

A. Definitions in AMCA 501 apply to this Section, unless otherwise specified.

B. Percent Free Area: Minimum, measured in sq. ft. of free area in a 4 ft. by 4 ft. (122 cm by 122 cm) louver.

C. Free Area Velocity: Minimum, at beginning point of water penetration.

D. Air Volume Flow Rate: Minimum, at beginning point of water penetration through a 4 ft. by 4 ft. (122 cm by 122 cm) louver.

E. Pressure Drop: Maximum, at beginning point of water penetration, measured using a 4 ft. by 4 ft. (122 cm by 122 cm) louver.

1.3 REFERENCED STANDARDS

A. Edition Dates: Current edition at Bid Date, with applicable appendices and supplements if any, unless otherwise indicated or adopted by authorities having jurisdiction.

B. Air Movement and Control Association (AMCA) International:
1. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating
2. AMCA 501 - Louver Application Manual and Design Guide
3. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices

C. American Society of Civil Engineers / Structural Engineering Institute (ASCE/SEI):
1. ASCE/SEI 7 Minimum Design Loads For Buildings and Other Structures.

D. ASTM International (ASTM):
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.4 ADMINISTRATIVE REQUIREMENTS
A. Coordinate with the Work of other Sections for sequencing and scheduling to avoid delays, and for completeness of weatherproofing system.

1.5 ACTION SUBMITTALS
A. Shop Drawings.
1. Louver layout plan, elevations, opening and clearance dimensions, tolerances, and anchorage.
2. Head, jamb, and sill details.
3. Blade configuration, screens, blank-off panel areas, and frames.
4. Field Measurements: Verify actual measurements by field measuring before fabrication and include measurements in shop drawings. Coordinate field measurements and fabrication schedule to avoid delays.

B. Product Data: Design characteristics, maximum recommended air velocity, design free area based on 16 sq. ft. (1.5 sq. m) louver, materials, and finishes. Include calculations prepared by a professional engineer registered in project location.

C. Sustainable Design Submittals: Manufacturer to provide third-party verified Environmental Product Declaration specific to the submitted louver model.

1.6 INFORMATIONAL SUBMITTALS

A. Test Data: Certified test data showing published test results for specified performance, based on AMCA 500-L and AMCA 511.

B. Samples: Color samples illustrating specified finish.

C. Manufacturer's Instructions: Include installation instructions, rough-in dimensions, special procedures, and perimeter conditions requiring special attention.

1.7 QUALITY ASSURANCE

A. Conform to AMCA Certification Ratings Program and mark units with AMCA Certified Ratings Seal.

B. Manufacturer Qualifications: Member of AMCA, producing tested louvers conforming to with provisions of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver until construction work which might cause damage to exterior metal wall louvers is complete.

B. Conform to manufacturer's instructions. Deliver and store in original, unopened, protective containers and packaging with seals intact and labels clearly identifying product name and manufacturer. Store in a safe, protected location. Handle in a manner to protect from damage.

1.9 WARRANTY

A. Warranties shall not deprive Owner of other rights Owner may have by law or under other provisions of the Contract Documents, and will be in addition to and run concurrently with other warranties made under the Contract Documents.

B. Manufacturer's AAMA 2605 Kynar/Fluoropolymer Coating Warranty: [10][20] year warranty from date of shipment against excessive chalking or excessive color change, and against chipping, cracking, or peeling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design - Products:
1. Airolite Company, LLC (Basis of Design).
2. Ruskin
3. Substitutions: Refer to section 01 25 00.

2.2 PERFORMANCE / DESIGN CRITERIA

A. Weather Resistance of Louvers: Tested according to AMCA 500-L and certified under AMCA 511.

B. Structural Design of Louvers: Engineer louver to resist wind load indicated by Structural Drawing Notes and ASCE/SEI 7 for Wind Load and Exposure.

2.3 FIXED NON-DRAINABLE BLADE LOUVERS

A. Airolite Model K606:
   1. Louver Depth: 6 inches.
   2. Blade: 0.081 inch (2.06 mm).
   3. Frame: 0.081 inch (2.06 mm).
   4. Blade Angle: 37 and 45 degrees.
   5. Percent Free Area: 53.5%
   6. Performance at Beginning Point of Water Penetration
      a. Free Area Velocity: 739 fpm.
      b. Max Intake Volume: 6326 cfm .
   7. Performance at 6,000 CFM (2.832 m3/s).
      a. Pressure Drop: 0.079 inch wg (0.022 kPa).
   8. Wind Resistance: Designed to withstand 25 PSF (1.2 kPa).

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 6063 T5 or T52 extruded aluminum alloy and temper.

2.5 FABRICATION

A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

D. Other: Attachments, accessories, supports, and as required for complete installations.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches o.c., whichever is less.

F. Provide subsills made of same material as louvers or extended sills for recessed louvers.

2.6 FINISHES

A. Exposed Aluminum: Kynar/Fluoropolymer Coating, 2-coat 70% Kynar paint/100% Fluoropolymer (AAMA 2605) factory-applied baked-on finish, AAMA 2605.
   1. Color: As selected by Architect from manufacturer's Standard Colors.

B. Unfinished exposed metal not accepted. Touch up uncoated metal for smooth, finished appearance matching color and gloss level of adjacent finish.

C. Joint Sealant Color: Match wall color.

2.7 ACCESSORIES

A. Fasteners: Aluminum or stainless steel.

B. Flashings: Same material and appearance as louver.

C. Joint Sealants: Specified in Section 079200.

D. Sill Drain Pan: Minimum 0.05 inch (1.27 mm) thick aluminum sheet, full depth and width of louver sill, 0.7 inch (17.78 mm) high side panels, sealed joints.

E. Bird Screening: Folded aluminum screen frame.
   1. Square aluminum mesh wire, 1/2-inch by 0.063-inch (12.70 mm by 1.600 mm), 80 percent free area.
      a. Finish: Mill finish aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive work of this Section before beginning work. Notify Architect in writing of conditions that are not acceptable.

B. Do not begin work of this Section until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Conform to manufacturer's instructions and provisions of Contract Documents.
B. Isolate dissimilar materials to prevent galvanic action.
C. Install exterior louvers to shed water to exterior of building.
D. Joint Sealant Installation: Specified in Section 079200.
E. Install louver screening.
F. Install blank-off panels at inactive wall louvers.

3.3 ADJUSTING

A. Repair or replace wall louvers with damaged components and finishes.

3.4 CLEANING

A. Leave wall louver installations clean, installation area free from debris and residue resulting from work of this Section.

END OF SECTION

SECTION 09 90 00 PAINTING AND COATING

PART 1 – GENERAL

1.01 SCOPE

A. Low Emitting Materials: For field applications that are inside the weatherproofing system, 75 percent of all paints and coatings, by volume or surface area, shall comply with requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers" Using CPDH Standard Method v1.2-2017.

B. Emissions and Pollutant Control: Not less than 85 percent of field-applied paints and coatings that are inside the weatherproofing system shall comply with either of the following:

1. Low-Emitting Materials: VOC emissions shall comply with requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers." Formaldehyde emissions shall not exceed 9 mcg/cu. m or 7 ppb, whichever is less.

2. VOC Content shall not exceed limits of authorities having jurisdiction and the following:
   a. Flat Coatings: 50 g/L.
   b. Nonflat Coatings: 100 g/L.
   c. Nonflat- High-Gloss Coatings: 150 g/L.
   d. Dry-Fog Coatings: 150 g/L.
   e. Industrial Maintenance Coatings: 250 g/L.
   f. Pretreatment Wash Primers: 420 g/L.
   g. Primers, Sealers, and Undercoaters: 100 g/L.
   h. Recycled Coatings: 250 g/L.
   i. Rust-Preventative Coatings: 250 g/L.

C. Generally or unless noted otherwise, the following surfaces are to be painted/finished (not all surfaces may apply to this project):

1. Exterior surfaces
   a. Concrete Masonry Unit walls
   b. Concrete walls, beams, columns & soffits
   c. Wood siding, trim, frames, doors and sashes
   d. Plaster / stucco walls and soffits
   e. Hardboard siding
   f. Bare metal, primed metal and galvanized metal (unless noted unpainted)
   g. All other surfaces noted on the drawings to be painted
   h. All mechanical grillwork not prefinished and installed by HVAC
   i. Pavement Markings
2. Interior Surfaces
   a. Gypboard, plaster, concrete, concrete masonry walls, ceilings and soffits
   b. Bare metal, primed metal and galvanized metal (unless noted unpainted)
   c. Finish wood trim, paneling and frames (transparent finish)
   d. Wood doors (factory finished)
   e. Wood cabinets and shelving (transparent finish)
   f. Wood floors, railings and handrails (transparent finish)
   g. Pipes, ducts, hangers and supports, equipment and equipment enclosures not factory finished
   h. Access panels
   i. Plywood panelboards for telephone and electrical panels
   j. All other surfaces noted on the drawings to be painted

D. Generally, the following surfaces are NOT to receive paint:

1. Exterior architectural finish concrete masonry and brick (shall receive water repellent)
2. Items specified with factory finish
3. Items indicated to receive other finish
4. Items indicated to remain unfinished
5. Marble, granite, slate and other natural stones
6. Brick, concrete, cast stone, integrally colored concrete and plaster
7. Glass
8. Stainless steel, anodized aluminum, bronze.
9. Equipment nameplates, fire rating labels and operating parts of equipment
10. Acoustical materials (including acoustical decking)
11. Concealed pipes, ducts and conduits

E. Furnish all materials, labor, services, tools and incidentals necessary for completion of painting of exposed interior and exterior surfaces and other items as scheduled.

F. Work of this section is in addition to shop priming and surface treatments included elsewhere.

G. Standard paint coating terms as defined in ASTM D16 shall apply to this section.

H. Paint and/or finish the entire work, whether every item is herein specified or not. Where a specific item is not mentioned but requires painting or finishing, it shall be painted or finished to the specifications of similar or adjacent work. Do not paint surfaces or materials where specifications indicate surface to remain natural.

I. Includes examination of plans, finish schedules, the specifications for other divisions, and thorough familiarization with all provisions regarding painting of items left unfinished by other divisions that shall be painted to completion. If necessary, move scaffold to permit installation of other work without additional expense to the owner.

1.02 NOT USED

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM) D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. Steel Structures Painting Council (SSPC) SP6 - Commercial Blast Cleaning Procedures.

C. Steel Structures Painting Council (SSPC) SP10 - Near White Blast Cleaning Procedure.

1.04 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16.

B. All paint shall comply to the following gloss and sheen standards

1. Gloss Level 1 (Traditional matte finish – flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.

2. Gloss Level 2 (high side sheen flat - 'a velvet-like' finish): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

3. Gloss Level 3 (traditional 'eggshell-like' finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.

4. Gloss Level 4 ('satin-like' finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.

5. Gloss Level 5 (traditional semi-gloss finish): 35 to 70 units at 60 degrees, according to ASTM D523.

6. Gloss Level 6 (traditional gloss finish): 70 to 85 units at 60 degrees, according to ASTM D523.

7. Gloss Level 7 (high gloss finish): More than 85 units at 60 degrees, according to ASTM D523.

C. Environments: The following terms distinguish between different corrosive exposures:

1. "Severe environments" are highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation and with frequent cleaning using strong chemicals. Environments with heavy concentrations of strong chemical fumes and frequent splashing and spilling of harsh chemical products are severe environments.

2. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.

3. "Mild environments" are industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, and infrequent cleaning with strong chemicals. Environments with low levels of mild chemical fumes and occasional splashing and spilling of chemical products are mild environments. Normal outdoor weathering is also considered a mild environment.

1.05 QUALITY ASSURANCE

A. Installer 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. Lead Renovation, Repair and Painting Rule (RRP Rule)

1. The EPA Lead Renovation, Repair and Painting Rule shall apply under this contract if facility being renovated under the scope of this project houses pre-school or kindergarten students and was constructed before 1978.

2. Any firm performing renovation, repair and painting that disturbs lead-based paint in the above type facility shall have their firm certified by EPA (or an EPA authorized state) as a Lead-Safe Certified Renovation Firm, use certified renovators trained by EPA approved training providers and follow lead-safe work practices.

Refer to the following websites for more information:

http://www2.epa.gov/lead/epa-lead-safe-certification-program

http://www2.epa.gov/lead/renovation-repair-and-painting-program

C. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

D. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

E. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

F. All Painting Materials: Deliver to site in manufacturer's sealed containers. Each container shall be labeled by the manufacturer including company name, brand, type of paint, color, and instruction for reducing.

G. All materials applied to same surface from the primers through finish coats shall be by the same manufacturer.

H. Materials of any manufacturer will not be allowed on the project site at any time during construction except those of the manufacturer specified or approved by the architect.

I. Materials shall be mixed in and applied directly from containers in which they are purchased except when use of other containers is approved by the architect.

J. Turpentine, mineral spirits, linseed oil, and thinners shall be used only as recommended by the manufacturer of the specified paint material herein specified.

1.06 SUBMITTALS, SCHEDULES AND SAMPLES

A. Submit a manufacturer's authorized representative "Schedule for Materials" for approval within thirty (30) days after the contract date, giving the manufacturer and specifications as to type of each material intended for use on the work. Provide manufacturer's letter certifying that the total list of materials are "first-line products" and that proposed application methods at respective surfaces are in accordance with manufacturer's recommended application. Do not start any work until all materials are approved as conforming to specifications.

B. Sustainable Design Submittals:
1. Product Data: For paints and coatings, indicating VOC content.
2. Environmental Product Declaration (EPD): For each product.
3. Health Product Declaration (HPD): For each product.
4. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
5. Environmental Product Declaration (EPD): For each product
6. Third-Party Certifications: For each product
7. Third-Party Certified Life-Cycle Assessment: For each product
8. Manufacturer Inventory: For each product, provide manufacturer's manifest of ingredients.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Matching Existing Paint Colors

1. When the drawings call for paint to match existing in the case of renovation projects - the colors shall be selected by the following methods:

a. District/owner and/or maintenance staff to provide architect with a list of paint colors already utilized throughout the building or campus. Warehouse inventory may aid in making the selection.

b. Contractor to field verify colors by using a scanning color matching device. Example: Color Muse http://colormuse.io/ , download app and use with smartphone. Contractor to provide list to architect for records.

c. Architect to select colors.

E. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as “Sherwin Williams “Custodian Project Color and Product Information” report or equal.

1. Manual shall include an Area Summary with finish schedule, Area detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch up procedures, and color samples of each color and finish used.

F. The architect will issue a color schedule showing the various colors and their locations before samples are made.

G. Prepare samples of finishes on the job for review by owner and architect. Provide “layered” or “stepped” samples defining each separate coat, including all fillers and primers. Use colors represented in color schedule. Resubmit until required sheen, texture and color are accepted. List all materials used on each sample and label for location to be used.

H. If required, apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made to demonstrate aesthetic effects and set quality standards for materials and execution. A small portion of wall surface, 4’ x 8’, shall be finished as final sample. Submit one sample 12” x 12” of each type natural or stained finished on specified wood. Approval of mockups does not constitute approval of deviations from the Contract Documents continued in mockups unless specifically approved such

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver all products to the site in manufacturer’s original, unopened containers bearing manufacturer’s label with the following information:

Product name of material
Product description
Manufacturer’s item number and date of manufacture
Content by volume, for pigment and vehicle components
Application and thinning instructions
Color name and number
VOC Content

B. Store any materials not used in tightly covered containers in a well-ventilated area at temperature not less than 45 degrees or more than 95 degrees F.

1.08 PROJECT CONDITIONS

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

B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).

D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

E. 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.

1.09 ATTICK STOCK

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. Deliver extra materials to Owner.

B. Quantity: Furnish Owner with an additional five percent, but not less than 2 gallon, of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The first line product of the following manufacturers shall be acceptable for use throughout the project:
1. PPG Paints
2. Benjamin Moore & Co.
3. Sherwin Williams
4. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

B. 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.

C. Provide manufacturer’s best quality paint materials for the coatings specified and that are recommended by the manufacturer for the application indicated. Painting material containers which do not display the original manufacturer’s identification labels are not acceptable.

D. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that have a VOC classification as noted in paragraph 1.01 above.

E. Substitution submittal shall list the specified location and paint product number along with the proposed substitute paint product type and number or name. Refer to Supplementary General Conditions and Division 1 regarding substitutions.

F. Manufacturer shall have paint outlet that is staffed during normal 8:00 a.m. to 5:00 p.m., Monday through Friday work week with full line of stocked paints and with full match and mix capabilities for custom colors.

G. Provide paint colors as indicated in the finish schedule supplied by the Architect. Refer to paint schedule at the end of the specification.

H. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION / CONDITION OF SURFACES

A. Examine all surfaces to receive painting before beginning work and correct defects that could affect quality of finished work. Prepare surfaces to receive painting as specified. Re-touch shop coats and prime coats if damaged before proceeding. For remodel work where painting of existing, previously painted/finished/coated surfaces is required, properly remove existing finish and prepare surface for new paint finish as indicated.

B. Inspection of Surfaces: Do not begin work on any surface until inspected and in proper condition to receive paint specified. If the surface to be finished cannot be put in proper condition for finishing by customary preparation methods, the painting contractor shall notify the general contractor and architect, in writing, or thereby assume responsibility for and correct any unsatisfactory finish resulting.

C. Starting of painting work shall be construed as evidence of acceptance of surfaces and conditions under which work will be done.

3.02 PREPARATION AND WORK PROTECTION

A. Remove hardware, accessories and other items not scheduled to be painted. Provide appropriate edge and surface protection for items which are not practical for removal. After completion of work in each area, reinstall items removed using workers skilled in the trades involved.

B. Drop cloths shall be laid in all areas where painting to protect floors and other work from paint damage. Protect all existing materials and furnishings.

C. Materials shall be stored in a satisfactory manner or where directed. Oily rags and waste must be removed from the building every night and under no circumstances shall they be allowed to accumulate.

D. Painting Contractor shall be responsible for any damage done to the work of others caused by executing the work herein. Replace or repair, at own expense, materials damaged to such an extent that they cannot be restored to "as new" condition.

3.03 PREPARATION OF SURFACES - GENERAL

A. General Preparation: All surfaces to be finished shall be physically tight, in first class condition as to profiles, joints, etc. Rough matter, rough spots, prime coat paint runs, etc., shall be removed.

B. All surfaces must be absolutely smooth and free of dirt, rust, grease, rough spots, etc.

C. Proper preparations of all surfaces will be strictly enforced and whenever the finished surfaces show defects due to improper workmanship, defects shall be removed and work refinished at no additional cost to the Owner.

D. Before painting, remove hardware, accessories, plates, lighting fixtures, and similar items. On completion of each space, replace above items. Use only skilled mechanics for such work. When spray painting, protect adjacent surfaces as required or directed.

E. Caulking shall be uniformly and properly applied.

3.04 PREPARATION AND CLEANING OF SURFACES – CONCRETE/CMU/MASONRY/STUCCO

A. All work shall be allowed to dry completely (usually 60 to 90 days before painting).

B. Thoroughly clean and properly prepare all CIP concrete, concrete masonry (CMU), and cement plaster surfaces to be painted. Remove any dust, efflorescence, dirt, chalk, grease & oils and any release agents. Roughen any glazed surfaces or use mechanical methods to properly prepare surfaces.

C. Do not paint surfaces if moisture content or alkalinity exceeds that permitted in the coating manufacturer's written instructions.

D. If concrete floors are scheduled to be painted or sealed, clean with 5 percent solution of muratic acid or other etching cleaner. Flush floor with water to remove acid, neutralize with ammonia, thoroughly rinse again and allow to dry before painting or sealing.

E. Remove concrete stains resulting from weather, oil or corroded metals as follows:

Rust: If the stain is light or shallow, mop the surface with a solution of 1 lb oxalic acid per gal of water. Wait two or three hours, and then scrub the surface with stiff brushes while rinsing with clear water. If the stain is deep, use a poultice. Mix 11 oz (by weight) sodium citrate and 2 qt lukewarm water. Add 2 qt 12 oz glycerol. Make a stiff poultice with diatomaceous earth or talc; trowel over the stain. Leave the poultice for 2 or 3 days. Repeat if necessary.

Oil: If the oil is freshly spilled, soak it up with absorbent paper; do not wipe it up. Cover the stain with a dry powdered material such as portland cement, hydrated lime, cornmeal, or cat litter. Wait approximately 24 hours, then sweep it up. Scrub the remaining stain with scouring powder or a strong soap solution. If the stain is old, cover it with flannel soaked in a solution of equal parts acetone and amyl acetate. Cover the flannel with a pane of glass or a thin concrete slab for 10 to 15 min. Repeat if necessary. Rinse when the cleaning process is complete.

F. Painting subcontractor shall notify contractor to remove all mortar daubs, eliminate pinholes, remove chipped or otherwise unacceptable C.M.U. before start of block filler work.

G. When surface preparation is complete, including complete coverage of block filler, notify Architect for review prior to application of finish coats.

3.05 PREPARATION AND CLEANING OF SURFACES – FERROUS METALS

A. Clean surfaces shop-painted ferrous metals free of concrete, mortar, plaster, rust, shavings, dirt, dust and other objectionable materials. Use solvents or mechanical cleaning methods complying with SSPC- level SP-3: Power Tool Cleaning, SP-1 Solvent Cleaning, SP-2 Hand Tool Cleaning, SSPC-SP7/ NACE No.4, SSPC-SP 11.

B. Touch-up shop applied primer and any bare areas which have been damaged.

C. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.06 PREPARATION AND CLEANING OF SURFACES – GALVANIZED METALS

A. Clean galvanized surfaces free of loose particles and other objectionable materials. Clean with non-petroleum based solvents so that surface is free of oil, dirt and other contaminants.

B. Coat welded, chipped or abraded surfaces with Galvalloy protective coating or ZRC Galvilite Zinc coating (1-800-831-3275) after wire brush cleaning.

C. Wipe surfaces to be painted with manufacturer's recommended surface conditioner for painting of galvanized surfaces.

3.07 PREPARATION AND CLEANING OF SURFACES – WOOD

A. Clean knots, pitch streaks or visible sap spots free of residue and treat with Knot Sealer. Apply second coat of sealer no less than two (2) hours after application of first coat.

B. Clean surfaces free of dirt, oil, grease and other objectionable substances with scrapers, mineral spirits and sandpaper.

C. Fill all nail holes and other indentations with compatible wood filler to match wood and sand smooth with No. 00 sandpaper. Remove all dust with tack rags prior to finishing.

D. Backprime all wood sheet products which contact masonry, plaster or other wet wall construction. Prime all edges, ends, faces, undersides, and backsides of wood.

E. Any wood not stained or painted shall be sealed with non-yellowing polyurethane or varnish. Cracks, screw holes and nail holes shall be filled with putty to match natural wood prior to final coats of finish.

F. Sandpaper all trim edges to ease edge before start of work.

G. Sand between each paint coat to produce an even, smooth finish free from scratches, brush marks, paint brush hairs, etc.

3.08 NOT USED

3.09 APPLICATION

A. Exterior Surfaces: Do not paint while damp, during rainy or frosty weather, or when temperature is below 45°F, not while exposed to hot sun or above 90°F.

B. No interior painting or finishing shall be permitted until building has thoroughly dried out by natural or artificial heat.

C. Do not open containers until required for use. Thoroughly mix paint before application and frequently stir during application so as to maintain pigment satisfactorily in suspension.

D. DO NOT THIN PAINT in excess of the printed directions of the manufacturer..

E. Apply paint uniformly without visible laps, sags, curtains, holidays or objectionable brush marks. Exercise care so that paint does not splatter on surfaces not required to be painted. Promptly remove paint applied or splattered on surfaces not required to be painted.

F. All coats shall be thoroughly dry before applying succeeding coats; sand lightly between coats on all materials.

G. Apply coats of material in strict accordance with manufacturer's current published specification.

H. Spotting or covering of small areas will not be permitted unless covered by at least one (1) additional coverall coat.

I. Rooms shall be swept/vacuumed out before applying finish and no sweeping shall be done adjacent to such finish not yet dried dust free.

J. All “hot” or “flat” spots that may appear in the cement surfaces after the priming coat has been applied shall be “spotted in” with the same material before the second coat. “Hot” or “flat” spots showing after the finish coat has been applied shall be refinished as before.

K. The inside of all cases, cabinets, etc. shall be finished exactly as specified for the exterior face of same unless otherwise specified.

L. Doors: Before hanging, finish tops, bottoms, and edges same as faces after they have received final fitting to frame. Paint glass light frames in doors color to match door frame color.

M. All closets shall be finished the same as the adjoining room unless otherwise specified.

N. Paint factory finished access panels, registers, grilles, diffusers, electrical panel boxes, covers and similar items the same color as adjoining walls or ceilings. Use color as directed where adjacent surfaces do not require painting.

O. Where visible through registers or grills, paint interior surfaces of ducts with a flat black paint.

P. Block Filler: Apply block filler to masonry block at a rate and thickness to insure complete coverage and that NO PIN HOLES ARE VISIBLE.

Q. Mechanical items to be painted include:
uninsulated metal piping
uninsulated plastic piping
pipe hangers and supports
tanks without factory applied finish
duct, equipment and pipe insulation having “all service jacket” or other paintable jacket material
mechanical equipment that is indicated to have factory primed finish for field painting

3.10 WORKMANSHIP

A. Top quality, using skilled mechanics only.

B. Only the best workmanship is acceptable. All material shall be spread and smoothly flowed on without runs, streaks, sags, brush marks, unfinished patches or other blemishes.

C. Illumination: Provide adequate illumination. Poor illumination will be grounds for rejection of work. Minimum of 20-foot candles for all surfaces.

3.11 REVIEW OF WORK / QUALITY CONTROL

A. Each coat must be reviewed and approved by the General Contractor before application of the succeeding specified coat. If not reviewed by the General Contractor, no credit will be given for the coat applied and the General Contractor automatically assumes the responsibility to recoat the work in question.

B. Tint each undercoat a lighter shade to facilitate identification of each coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. Should question arise over the number of coats applied to an area or space which was not inspected as stated above, the construction manager or architect may, at his option, require additional coats to be applied and the work shall be performed by this division without additional charge.

D. Any areas or surfaces not covered or showing variation of shades due to uneven application of materials shall receive additional coats to cured film until uniform paint finish, color, and appearance are corrected.

E. At completion of work, clean off all paint spots, oil and stains from floors, tile work, woodwork, glass, hardware, etc. leaving the building in perfect condition as far as this work is concerned.

F. Dry-Film Thickness (DFT) Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for DFT.

1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that DFT of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide DFT that complies with paint manufacturer's written instructions.

3. Owner may direct Contractor to stop painting if test results show material being used does not comply with the specified requirements. If necessary, Contractor may be required to remove no-complying paint from the painted surfaces if material is tested and shown to not be in compliance with the specifications.

3.12 CLEAN UP

A. Cleaning: At completion of paint work, the contractor shall remove from the premises all excess material, paint cans, drop cloths, and other materials used in this work. This contractor shall remove from other work all paint droppings or dirt caused by this work.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.

2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.

3. Allow empty paint cans to dry before disposal.

4. Collect waste paint by type and deliver to recycling or collection facility.

3.13 PAINTING SCHEDULE *(NOT ALL ITEMS LISTED BELOW MAY BE IN THE PROJECT. REFER TO THE DRAWINGS FOR LOCATION AND EXTENT OF ITEMS TO BE PAINTED.)*

EXTERIOR

A. CONCRETE MASONRY UNIT BLOCK FILLERS/PRIMER

1. Benjamin Moore & Co.: Ultra Spec Hi-Build Masonry Block Filler 571

2. PPG Paints: Speedhide Latex Hi Fill Block Filler No. 6-15XI. Applied at a DFT 8.0 mils.
3. Sherwin Williams: S-W PrepRite Interior/Exterior Latex Block Filler B25W25 (One Coat at16 mils wet; 7.7 mils dry)

B. CMU LATEX Finish Coat(s):

1. Benjamin Moore: Provide product recommended by manufacturer.
2. PPG Paints: Speedhide Exterior 100% Acrylic Latex Satin 6-2045XI Series. Applied at a DFT of 1.3 mils.
3. Sherwin-Williams: A-100 Exterior Latex, Satin, A82-Series (Two Coats @ 4 mils wet;1.4 mils dry)

C. CONCRETE MASONRY UNIT (CMU) BLOCK FILLER/PRIMER – SURFACE SEALER

Prime Coat:

1. Benjamin Moore & Co.: Ultra Spec Acrylic Sealer 608. Applied at a DFT of 0.95 mils.
2. PPG Paints: Perma-Crete 4-808 Series Acrylic Masonry Sealer. Applied at a DFT of 0.7 – 1.4 mils.
3. Sherwin Williams: Loxon Conditioner A24W01100. Applied at a DFT of **X** mils.

D. CMU FINISH TOPCOAT(S) – ELASTOMERIC:

Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Manufacturer's recommended product.
2. PPG Paints: Perma-Crete Pitt-Flex Elastomeric 4-110XI. Applied at a DFT of 5.4 - 7.2 mils.
3. Sherwin-Williams: Loxon XP, Satin, LX21-50 Series (One to Two Coats over Block Filler @ Wet mils: 17-21.5, Dry mils: 6.5-8.2)

E. CONCRETE/MASONRY/STUCCO PRIMER:

Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Manufacturer's recommended product.
2. PPG Paints: Perma-Crete 4-603XI Alkali Resistant Primer (Applied at a DFT of 1.4-2.6 mils).
3. Sherwin-Williams: Loxon Concrete Masonry Primer Sealer, LX02W0050 (One Coat at 5.3-8.0 Wet Mil Thickness, 2.1-3.2 Dry Mil Thickness)

F. CONCRETE/MASONRY/STUCCO FINISH COATS:

Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Super Spec Exterior Latex Satin 184. Applied at a DFT of 1.0 mils.
2. PPG Paints: Speedhide Exterior Latex Satin 6-2045XI. Applied at a DFT of 1.3 mils.
3. Sherwin-Williams: A-100 Exterior Latex, Satin, A82-Series (Two Coats @ 4 mils wet;1.4 mils dry)

G. EXTERIOR ACRYLIC ENAMEL (For exterior concrete, masonry, wood where semi-gloss or gloss finish is required):

Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Ultra Spec HP Acrylic DTM Gloss Enamel HP28
2. PPG Paints: Pitt-Tech Plus Acrylic Gloss DTM Industrial Enamel 90-1310. Applied at a DFT of 2.0-4.0 mils.
3. Sherwin Williams: S-W Pro Industrial Acrylic, Semi-Gloss or Gloss, B66 Series (Two finish coats over appropriate primer @ Wet mils: 6.0-12.0,

Dry mils: 2.2-4.4)

H. **EXTERIOR FERROUS (NOT GALVANIZED) METAL PRIMER**
Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Ultra Spec HP Acrylic Metal Primer HP04
2. PPG Paints: Pitt-Tech Plus Primer 4020PF. Applied at a DFT of 2.2-3.5 mils.
3. Sherwin Williams: Pro-Cryl Universal Water Based Primer B66-1300 (1 Coat at 5.0-10.0 wet mils, 1.9-3.8 Dry Mil Thickness)

I. **EXTERIOR GALVANIZED METAL PRIMER**
Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Ultra Spec HP Acrylic Metal Primer HP04
2. PPG Paints: Pitt-Tech Plus Primer 4020PF. Applied at a DFT of 2.2-3.5 mils.
3. Sherwin Williams: Pro-Cryl Universal Water Based Primer B66-1300 (1 Coat at 5.0-10.0 wet mils, 1.9-3.8 Dry Mil Thickness)

J. **EXTERIOR GALVANIZED TOUCH-UP FOR UNPAINTED GALVANIZED SURFACES**

1. ZRC Worldwide Galvalite #10,000 Touch up primer (Availability call 1-800-831-3275)

K. **EXTERIOR METAL FINISH PAINT EXTERIOR ENAMEL** (For all exposed Steel, Exterior and Interior Hollow metal doors & frames)
Intermediate Coat and Top Coat (2 Coats)

1. Benjamin Moore: Super Spec Urethane Alkyd Gloss P22
2. PPG Paints: HPC Urethane Alkyd Enamel Semi-Gloss 4336H. Applied at a DFT of 2.0-2.5 mils.
3. Sherwin Williams: S-W Pro Industrial Waterbased Urethane Alkyd, Semi-Gloss, B53 Series (Two Coats over appropriate Primer @ Wet mils: 4.0-5.0, Dry mils: 1.4-1.7)

END OF SECTION 09 90 00

SECTION 10 05 00 MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 SCOPE

A. Furnish and install all of the following equipment as shown on drawings and specified herein. Coordinate with other trades where such cooperation is indicated by furnishing installation requirements and details along with the material in adequate time for progress of the work. Furnish shop drawings.

B. All items shall be installed with anchors appropriate to the wall construction.

C. Securely install, plumb, level, square with surrounding area to height and location as directed by architect.

PART 2 - PRODUCTS

1.01 SPECIAL ITEMS

A. Hose Bib - Furnish and install Basis of Design product complete;
   a. MDF 24-8 SMSS Hydrant Specifications
   b. One piece weld construction with MDF standard 304 schedule 10 stainless steel.
   c. Supplied with 3/4” anti-siphon vacuum breaker, frost resistant sill cock with
   d. removable handle.
   e. This unit comes standard with a Recessed Hose Bibb with Locking Cover.
   f. Oven baked powder coat. Architect to select color from manufacturer’s full range of color options.
   g. Surface Mount installation for new or existing concrete surface. Provide an access door with vandal resistant stainless steel screws.
      i. For a new surface, provide a surface mount carrier.
      ii. For an existing surface, anchor bolts are to be used through the attached mounting plate.
   h. Flush all new or existing supply lines prior to installation.
   i. One year warranty.
   j. Substitutions refer to Section 01 25 00

B. Dual Temp Hose Box with Door and Vacuum Breaker manufactured by ACRON; Acorn Engineering
   1. Product Type: Hose Box
   2. Material: Stainless Steel
   3. Mounting: Recessed
   4. Product Features: Hot & Cold, Vacuum Breaker, Door limiting unauthorized use.

PART 3 - NOT USED

END OF SECTION 10 05 00

SECTION 10 44 13 FIRE EXTINGUISHERS AND CABINETS

PART 1 – GENERAL

1.01 SCOPE

A. Furnish and install fire extinguishers and cabinets at locations shown on the drawings and as specified herein. Coordinate with other trades where such cooperation is indicated by furnishing installation requirements and details along with the material in adequate time for progress of the work.

B. All items shall be installed with anchors appropriate to the wall construction.

C. Securely install, plumb, level, square with surrounding area to height and location as directed by architect.

1.02 SUBMITTALS

A. Submit product data: Include cabinet construction and semi-recessed wall installation details, material descriptions, dimensions of individual components and profiles and finish for cabinets and extinguishers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. J.L. Industries, Inc. http://jlindustries.com
B. Larsen's Manufacturing Co. http://www.larsensmfg.com/

C. Substitutions allowed but must be approved minimum 7 days prior to bid date.

2.02 FIRE EXTINGUISHERS AND CABINETS

A. Provide fire extinguisher cabinet and portable extinguishers of type, size and capacity for each cabinet and other locations as indicated.

B. Corridor locations and all general purpose areas shown on the drawings:

1. **FIRE EXTINGUISHER CABINETS**

a. J.L. Industries, Inc., "Cosmopolitan Series", Stainless Steel Model 1037 with FX option, L-22 door style (solid with Saf-T-Lok and handle), semi-recessed cabinet, 2-1/2" rolled edge trim. All cabinets to have Fire-FX option. Provide horizontal, black, die-cut "FIRE EXTINGUISHER" letters on each cabinet.

OR

a. Larsen's, "Architectural Series", Stainless Steel Model 2409-6R with "flame shield" fire-rated cabinet option, semi-recessed cabinet, 2-1/2" rolled edge trim. Provide solid, stainless steel door with "Larsen-Loc" option and horizontal, black, die-cut "Fire Extinguisher" letters on each cabinet.

2. **FIRE EXTINGUISHER + FIRE BLANKET CABINETS**

a. J.L. Industries, Inc., “Royal Series”, Stainless Steel Model 3637 with FX option, L-22 door style (solid with Saf-T-Lok and handle), semi-recessed cabinet, 2-1/2” rolled edge trim. All cabinets to have Fire-FX option. Provide horizontal, black, die-cut “FIRE EXTINGUISHER” letters and horizontal, red, die-cut “FIRE BLANKET” letters on each cabinet.

OR

a. Larsen’s, FB 3612 (similar to “Architectural Series”, Stainless Steel Model 3612) with “flame shield” fire-rated cabinet option, semi-recessed cabinet, 2-1/2” rolled edge trim. Provide solid, stainless steel door with “Larsen-Loc” option. Provide horizontal, black, die-cut “FIRE EXTINGUISHER” letters and horizontal, red, die-cut “FIRE BLANKET” letters on each cabinet.

3. **FIRE EXTINGUISHERS FOR CABINETS / WALL MOUNT**

a. J.L. Industries, Inc., “Cosmic 10E”, 10 lbs, UL rated 4A-80B:C. Provide 1 extinguisher per cabinet.

OR

a. Larsen’s, MP-10, 10 lbs., UL rated 4A-80B:C. Provide 1 extinguisher per cabinet.

b. In addition to fire extinguishers in public areas of the facility and unless indicated otherwise on the drawings, provide 1 fire extinguisher and wall mount bracket at the following locations:

1) Provide 1 in all electrical rooms
2) Provide 1 in all mechanical rooms
3) Provide 1 in all MDF rooms
4) Provide 1 in all IDF rooms
5) Provide 1 in generator area (if applicable)
6) At all stage areas, provide 1 ea. side (2 total) of stage behind curtain

4. **FIRE EXTINGUISHERS – FOOD PREP AREAS / KITCHENS (BRACKET MOUNTED)**

a. At kitchen areas, provide one (1) Larsen’s WC-CL, 6 liter capacity wet chemical, UL rated 2A:K with 1007 standard bracket mount AND one (1) Larsen’s MP-10, 10 lbs., UL rated 4A-80B:C with standard bracket mount. Surface mount on wall as shown on drawings or as directed by fire marshal.

OR

a. At kitchen areas, provide one (1) J.L. Industries, Inc., “Saturn 15”, 6 liter capacity wet chemical, UL rated K with MB810 mounting bracket AND one (1) “Cosmic 10E”, 10 lbs., UL rated 4A-80B:C with MB846 standard bracket mount. Surface mount on wall as shown on drawings or as directed by fire marshal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for cabinets to verify coordination so as to not interfer with in-wall mechanical, plumbing or electrical items.

B. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets are to be installed.

C. Examine fire extinguishers for proper tagging and charging. Remove and replace damaged, defective or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Comply with manufacturer's written instructions for installing cabinets and extinguishers.

B. MOUNTING HEIGHTS

1. Mount general use fire extinguisher cabinets at a height so that the fire extinguisher handle is at or below 48" AFF. Cabinets or extinguishers that will protrude more than 4" beyond the finish face of the wall shall be mounted so the bottom edge of the cabinet is no higher than 27" AFF (this does not apply to extinguishers located in mechanical/electrical areas).

2. Mount kitchen and special use extinguishers so that the fire extinguisher handle is at or below 48" above finished floor.

3.03 ADJUSTING, CLEANING AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinet doors damaged during installation.

C. Provide final protection and maintain conditions that ensure cabinets, doors and extinguishers are without damage or deterioration at time of Substantial Completion.

END OF SECTION 10 44 13

SECTION 11 68 50 ATHLETIC EQUIPMENT (BASEBALL & SOFTBALL)

PART 1 - GENERAL

1.1 SECTION INCLUDES
- A. Foul Poles
- B. Netting
- C. Padding
- D. Dugout Equipment

1.2 SUBMITTALS
- A. Submit Product Data for all items above.
- B. Submit Shop Drawings showing installation procedures, sizes and all materials specifications.

1.3 DELIVERY, STORAGE AND HANDLING
- A. Materials delivered to the site shall be examined for concealed damage or defects in shipping. Any defects shall be noted and reported to the Owner's representative.
- B. Replacements, if necessary, shall be immediately re-ordered, to minimize any conflict with the construction schedule.

1.5 WARRANTY
- A. Contractor to submit to the Engineer warranty specifying quantity of years for all items.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS
- A. All equipment needs to meet NFHS requirements. A few manufacturers are listed below:
  1. Sportsfield Specialties
  2. SportsEdge Solutions
  3. Nets of Texas
  4. Comparable product approved by Client and Designer.

2.2 BASEBALL/SOFTBALL EQUIPMENT
- A. Provide two (2) yellow powder coated steel Foul Poles with Wings, 30 feet in height at both baseball and softball.
- B. Netting:
  1. Backstop Netting:
     - a. Baseballl: 60' backstop netting with poles (two 70' poles behind bleachers) (Refer to site plan for location)
     - b. Softball: 40' backstop netting with poles (two 50' poles behind bleachers) (Refer to site plan for location)
     - c. Netting: # 36 UDR2 Dyneema UHWMPE twisted knotted fiber.
       1) Size of Mesh: 1 ¾" Square Mesh
       2) Weight: .02 lbs per sq.ft.
       3) Tensile Strength: 350 lbs per mesh (min)
       4) Burst Strength: 1330 per mesh
     - d. Perimeter Rope: #84 Double Braded back nylon lancing cord
     - e. Cable: Stainless steel 3/8" Aircraft Cable- Used at Top and Bottom of Poles
       1) Tensile Strength: 15,000
       2) Cable Clips: Galvanized- Minimum 2 each per connection

3) Cable Shackles: ¼" Galvanized; attached 2' O.C. to perimeter cable and rib cable. Breaking strength 1,400 # minimum.
4) Cable Turn Buckles: ¾" Galvanized x 12"
5) Cable Eye Bolts: ¾" Galvanized x 12"

f. Netting Support Poles:
1. Hot dipped galvanized steel poles engineered to support net and deflection caused by tensioned cable.

g. Eyebolts:
1. Galvanized eyebolts/clevises turnbuckles and washers shall be provided by the net supplier. Netting shall align with the backstop wall and existing chain link fence, extending from the far end of the home dugout to the far end of the visitor dugout, unless otherwise noted. The net supplier shall adjust the length of eyebolts as required to achieve the design intent.

2. Dugout Netting : Netting supplier shall furnish netting material matching the backstop netting in type, gauge, and color to ensure uniform appearance and performance. Supplier shall submit coordinated shop drawings indicating attachment details, section interfaces, and transition conditions for dugout netting connections to the dugout structure, pony wall, and safety chain link fence in front of the dugout. Shop drawings shall clearly define all anchorage, tensioning hardware, and termination points required to achieve the design intent.

C. Padding:
1. Padding shall be manufactured by Sportsfield Specialties or approved equivalent.
a) Backstop Wall: Prozone outdoor wall padding
- 3" high performance dual density foam design
- 25oz UV resistant composite board
- Z-clip wall attachment
- 5-year limited fade warranty

b) Chainlink Fence in front of the Dugout Eight (8')Feet and Four (4') Feet , Refer to drawings for height. BOD: GRS96/GRS48 - Guard rail system or Equivalent with steel structure, protective rail pads, and Ultra Cross® netting. Refer to the material schedule for color of padding.
- Premium Outdoor Vinyl Encasement
- Ultra Cross® Knotless Dyneema® UHMWPE Netting
- 1.25" Thick High Density Polyethylene Cross-Link Closed Cell Foam

c) Fence and swing gates for entrance to the dugouts shall be provided as specified in the drawings. BOD: GRS swing gate system or Equivalent, seven (7'-0") feet in height, and shall include integrated fence and gate padding as part of the system. Refer to the material schedule for color of padding.

D. Dugout Equipment:
1. Equipment shall be manufactured by Sportsfield Specialties, Sports Edge Solutions or approved equivalent.
2. Benches:
a) New Benches shall be PTBTT - Two-tier polyboard team bench anchored to floor or equivalent
b) Existing Benches: Remove existing 2x wood bench seats. Existing metal frames shall be thoroughly prepared to ensure proper adhesion of new paint to the prepared surface. Paint all metal surfaces in accordance with PM Section 099000. Install new 2x wood seating using treated lumber, No. 1 grade, exterior above-ground, exposed to weather, frequent wetting (AWPA Use Category UC3B). All existing wood surfaces scheduled to remain shall be scraped, sanded, and spot primed before applying a full priming coat

and final paint in accordance with PM Section 099000. The contractor shall field-verify all existing bench dimensions prior to fabrication or installation.

c) Existing metal benches: Existing metal frame shall be thoroughly prepared to ensure proper adhesion of new paint to the prepared surface. Paint all metal surfaces in accordance with PM Section 099000

3. Racks:
   a) Helmets: SUWHCCRWM Helmet Cubby and Coat Rack Wall Mounting Unit or equivalent: Ref to Elevation for quantity and Locations
   b) Helmet and Bat combination: SUWHCBBSS Helmet, Bat Bin and Side Storage Stand-Up Cubby Unit or equivalent: Ref to Elevation for Locations
   c) Bats: SUABRPL15 Stand Alone Bat Rack or equivalent.
   d) All wood equipment called out to remain within the dugouts shall be scraped, sanded, and spot primed before applying a full priming coat and final paint in accordance with PM Section 099000.
   e) All Metal equipment called out to remain within the dugouts shall be thoroughly prepared to ensure proper adhesion of new paint to the prepared surface. Paint all metal surfaces in accordance with Section 09 90 00
4. **Alternate N0.06** - Glue Down Turf.
   a) Synthetic turf with 5mm pad glued to concrete slab. Refer to Specification Section 32 18 20.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All baseball and softball items to be installed per manufacturer's recommendations.

END OF SECTION 11 68 50

SECTION 260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Fire-alarm wire and cable.
4. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer's authorized service representative.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER 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 or less.

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B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Bare Conductor.
2. Belden Inc.
3. Encore Wire Corporation.
4. 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. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B496 for stranded conductors.

E. Conductor Insulation:
1. Type THWN-2: Comply with UL 83.
2. Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
3. Type XHHW-2: Comply with UL 44.

F. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, dual spirally wrapped copper tape shields and three bare symmetrically applied ground wires, and sunlight- and oil-resistant outer PVC jacket.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath. **Only** for branch circuit final vertical connection (i.e. “whip” or “drop”) to luminaires and receptacles in **non-exposed locations**.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Bare Conductor.
2. Encore Wire Corporation.
3. General Cable Technologies Corporation.
4. 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.

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2. Comply with UL 1569.
3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:
1. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.
3. .

H. Armor: Aluminum, interlocked.

I. Jacket: PVC applied over armor.

2.3 FIRE-ALARM WIRE AND CABLE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Wire & Cable Inc.
2. CommScope, Inc.
3. Radix Wire.
4. Superior Essex Inc.

B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 16 AWG size as recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire-alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a two-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation, and complying with requirements in UL 2196 for a two-hour rating.

1. Low-Voltage Circuits: No. 16 AWG, minimum, in pathway.
2. Line-Voltage Circuits: No. 12 AWG, minimum, in pathway.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket with red identifier stripe, NTRL listed for fire-alarm and cable tray installation, plenum rated.

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2.4 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. 3M Electrical Products.
2. Hubbell Power Systems, Inc.
3. Service Wire Co.
4. Thomas & Betts Corporation; A Member of the ABB Group.

C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: Two hole with long barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.

D. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Feeders below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.

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C. Branch Circuits below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

D. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

G. Complete cable tray systems installation according to Section 260536 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

3.4 INSTALLATION OF FIRE-ALARM WIRING

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method: Install wiring in metal pathway according to Section 270528.29 "Hangers and Supports for Communications Systems."
   1. Fire-alarm circuits and equipment control wiring associated with fire-alarm system shall be installed in a dedicated pathway system. This system shall not be used for any other wire or cable.

C. Wiring Method:

   1. Cables and pathways used for fire-alarm circuits, and equipment control wiring associated with fire-alarm system, may not contain any other wire or cable.
   2. Fire-Rated Cables: Use of two-hour, fire-rated fire-alarm cables, NFPA 70, Types MI and CI, is permitted.
   3. Signaling Line Circuits: Power-limited fire-alarm cables shall not be installed in the same cable or pathway as signaling line circuits.

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D. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with fire-alarm system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes; cabinets; or equipment enclosures where circuit connections are made.

F. Color-Coding: Color-code fire-alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire-alarm system junction boxes and covers red.

G. Wiring to Remote Alarm Transmitting Device: 1-inch conduit between the fire-alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.5 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-486B.

B. Make splices, terminations, 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. Comply with requirements in Section 283111 "Digital, Addressable Fire-Alarm System" for connecting, terminating, and identifying wires and cables.

3.6 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "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.

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3.7 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.8 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections with the assistance of a factory-authorized service representative.

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each of the following visual and electrical tests:

   a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
   b. Test bolted connections for high resistance using one of the following:

      1) A low-resistance ohmmeter.
      2) Calibrated torque wrench.
      3) Thermographic survey.

   c. Inspect compression-applied connectors for correct cable match and indentation.
   d. Inspect for correct identification.
   e. Inspect cable jacket and condition.
   f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
   g. Continuity test on each conductor and cable.
   h. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

   a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

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b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

4. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

B. Cables will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

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SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Nonmetallic conduits 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. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.
2. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

C. Source quality-control reports.

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PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allied Tube & Conduit; a part of Atkore International.
   b. Southwire Company.
   c. Thomas & Betts Corporation; A Member of the ABB Group.
   d. Western Tube and Conduit Corporation.
   e. Wheatland Tube Company.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. IMC: Comply with ANSI C80.6 and UL 1242.

5. EMT: Comply with ANSI C80.3 and UL 797.
6. FMC: Comply with UL 1; zinc-coated steel.
7. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Allied Tube & Conduit; a part of Atkore International.
   b. Southwire Company.
   c. Thomas & Betts Corporation; A Member of the ABB Group.
   d. Western Tube and Conduit Corporation.
   e. Wheatland Tube Company.

2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Fittings for EMT:

   a. Material: die cast.
   b. Type: compression.

6. 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.

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7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

C. Joint Compound for IMC, GRC, or ARC: 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.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business.
2. Hoffman; a brand of nVent.
3. Square D.

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: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. Hoffman; a brand of nVent.
3. Hubbell Incorporated.
4. Thomas & Betts Corporation; A Member of the ABB Group.
5. 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, aluminum, Type FD, with gasketed cover.

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E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

See Editing Instruction No. 2 in the Evaluations for a discussion of floor boxes.

F. Metal Floor Boxes:

1. Material: Cast metal.
2. Type: Semi-adjustable.
3. Shape: Rectangular.
4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Nonmetallic Floor Boxes: Nonadjustable, round.

1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. 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.

I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.

1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

J. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

L. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

M. Gangable boxes are prohibited.

N. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 Type 3R 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: Fiberglass.
3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

O. Cabinets:

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1. NEMA 250, Type 1 Type 3R 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

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC.
2. Concealed Conduit, Aboveground: GRC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. 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, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:

    a. Loading dock.
    b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    c. Mechanical rooms.
    d. Gymnasiums.

4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: GRC.
7. 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.

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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 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.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

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K. Support conduit within 12 inches of enclosures to which attached.

L. Raceways Embedded in Slabs:

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. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.

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. 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.

Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

R. 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.

S. 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.

T. 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.

U. Surface Raceways:

1. Install surface raceway with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section.

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Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

V. 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.

W. 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. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

Y. 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 and EMT 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 0.000078 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.

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Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, 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.

AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

BB. 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.

CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

DD. Locate boxes so that cover or plate will not span different building finishes.

EE. 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.

FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

GG. Set metal floor boxes level and flush with finished floor surface.

HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.

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a. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install 0sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.5 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 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.

END OF SECTION 260533

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SECTION 260544 SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A53/A53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

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C. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

D. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

E. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, Inc.
b. Metraflex Company (The).
c. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel.
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

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. HOLDRITE.

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2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

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3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

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END OF SECTION 260544

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SHEET NOT IN USE

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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Bands and tubes.
4. Tapes and stencils.
5. Tags.
6. Signs.
7. Cable ties.
8. Paint for identification.
9. Fasteners for labels and signs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.

B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For arc-flash hazard study.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

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B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

C. Comply with ANSI Z535.4 for safety signs and labels.

D. Comply with Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Colors for 240-V Circuits:

a. Phase A: Black.
b. Phase B: Red.

4. Colors for 480/277-V Circuits:

a. Phase A: Brown.
b. Phase B: Orange.
c. Phase C: Yellow.

5. Color for Neutral: White.
6. Color for Equipment Grounds: Green.
7. Colors for Isolated Grounds: Green with two or more yellow stripes.

C. Raceways and Cables Carrying Circuits at More Than 600 V:

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1. Black letters on an orange field.
2. Legend: "DANGER - CONCEALED HIGH VOLTAGE WIRING."

D. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

E. Warning labels and signs shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

F. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

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. Marking Services, Inc.
c. Panduit Corp.

2. Minimum Nominal Size:

a. 1-1/2 by 6 inches for raceway and conductors.
b. 3-1/2 by 5 inches for equipment.
c. As required by authorities having jurisdiction.

2.4 BANDS AND TUBES

A. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

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. Marking Services, Inc.
c. Panduit Corp.

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B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Panduit Corp.

2.5 TAPES AND STENCILS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Carlton Industries, LP.
b. Marking Services, Inc.
c. Panduit Corp.

B. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. HellermannTyton.
b. Marking Services, Inc.

C. Underground-Line Warning Tape:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Brady Corporation.
b. Marking Services, Inc.

2. Tape:

a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape shall be permanent and shall not be damaged by burial operations.
c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

3. Color and Printing:

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a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE"

2.6 CABLE TIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ideal Industries, Inc.
2. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

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B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

J. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
1. "120V POWER."
2. "277V POWER."
3. FIRE ALARM

K. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

L. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

M. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

N. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. 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 are required, use labels 2 inches high.

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O. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

P. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

Q. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

R. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

S. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

T. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

U. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trenchexceeds 16 inches overall.
2. Limit use of underground-line warning tape to direct-buried cables.

V. Metal Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

W. Nonmetallic Preprinted Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

X. Write-on Tags:

1. Place in a location with high visibility and accessibility.
2. Secure using general-purpose cable ties.

Y. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

Z. Metal-Backed Butyrate Signs:

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1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

AA. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

BB. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
1. "120V POWER."
2. "277V POWER."
3. FIRE ALARM

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

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F. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.

G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.

I. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

J. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

K. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

L. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape 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.

M. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.

N. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
   a. Controls with external control power connections.

O. Arc Flash Warning Labeling: Self-adhesive labels.

P. Equipment Identification Labels:

1. Indoor Equipment: Metal-backed butyrate signs.
2. Outdoor Equipment: Laminated acrylic or melamine sign.
3. Equipment to Be Labeled:

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a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a engraved, laminated acrylic or melamine label.
b. Enclosures and electrical cabinets.
c. Access doors and panels for concealed electrical items.
d. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
e. Enclosed switches.
f. Enclosed circuit breakers.
g. Enclosed controllers.
h. Variable-speed controllers.
i. Contactors.
j. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Distribution panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

F. SPD: Surge protective device.

G. VPR: Voltage protection rating.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.

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2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Key interlock scheme drawing and sequence of operations.
10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.6 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 Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 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. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

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1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.10 FIELD 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.

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Architect, Construction Manager, Owner no fewer than 5 days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without Architect's written permission.
3. Comply with NFPA 70E.

1.11 WARRANTY

When warranties are required, verify with Owner's counsel that warranties stated in this article are not less than remedies available to Owner under prevailing local laws.

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

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Verify available warranties and warranty periods with manufacturers listed in Part 2 articles.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."

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.

F. Enclosures: Surface-mounted, dead-front 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. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
d. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

2. Height: 84 inches maximum.
3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
4. Finishes:

a. Panels and Trim: Steel and galvanized 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: Same finish as panels and trim.

G. Incoming Mains:

1. Location: Convertible between top and bottom.

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2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.

a. Plating shall run entire length of bus.
b. Bus shall be fully rated the entire length.

2. 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.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
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: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
6. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
7. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
8. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.
9. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: 20 percent.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

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1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.3 POWER PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, distribution type.

C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.

1. For doors more than 36 inches high, provide two latches, keyed alike.

D. Mains: Circuit breaker.

E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.

F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker.

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D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

F. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton.
2. General Electric Company; GE Energy Management - Electrical Distribution.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; by Schneider Electric.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:

a. RMS sensing.
b. Field-replaceable rating plug or electronic trip.
c. Digital display of settings, trip targets, and indicated metering displays.
d. Multi-button keypad to access programmable functions and monitored data.
e. Ten-event, trip-history log. Each trip event shall be recorded with type, phase, and magnitude of fault that caused the trip.
f. Integral test jack for connection to portable test set or laptop computer.
g. Field-Adjustable Settings:

1) Instantaneous trip.
2) Long- and short-time pickup levels.
3) Long and short time adjustments.
4) Ground-fault pickup level, time delay, and I squared T response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

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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: Mechanical 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 HID lighting circuits.
f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
g. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system specified in Section 260913 "Electrical Power Monitoring and Control."
h. Shunt Trip: 24-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
i. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage with field-adjustable 0.1- to 0.6-second time delay.
j. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
k. Auxiliary Contacts: Two, SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
l. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
m. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
n. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
o. Multipole units enclosed in a factory assembled to operate as a single unit.
p. Auxiliary Contacts: Two normally open and normally closed contact(s) that operate with switch handle operation.

2.6 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: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

D. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

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1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.7 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

3.1 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.

B. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

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. Comply with NECA 1.

C. Install panelboards and accessories according to NEMA PB 1.1.

D. Equipment Mounting:

1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

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2. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Mount top of trim 90 inches above finished floor unless otherwise indicated.

G. Mount panelboard cabinet plumb and rigid without distortion of box.

H. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

I. Mount surface-mounted panelboards to steel slotted supports 1-1/4 inch in depth. Orient steel slotted supports vertically.

J. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

K. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

L. Install filler plates in unused spaces.

M. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

N. Mount spare fuse cabinet in accessible location.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

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3.4 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.

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 for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. optional tests. 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, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 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 Section 260573.16 "Coordination Studies."

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C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

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SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard-grade receptacles, 125 V, 20 A.
2. USB receptacles.
3. GFCI receptacles, 125 V, 20 A.
4. SPD receptacles, 125 V, 20 A.
5. Hospital-grade receptacles, 125 V, 20 A.
6. Hazardous (classified) location receptacles.
7. Cord and plug sets.
8. Toggle switches, 120/277 V, 20 A.
9. Decorator-style devices, 20 A.
10. Occupancy sensors.
11. Digital timer light switches.
12. Wall-box dimmers.
13. Wall plates.
14. Poke-through assemblies.
15. Prefabricated multioutlet assemblies.

1.3 DEFINITIONS

A. AFCI: Arc-fault circuit interrupter.

B. BAS: Building automation system.

C. EMI: Electromagnetic interference.

D. GFCI: Ground-fault circuit interrupter.

E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

F. RFI: Radio-frequency interference.

G. SPD: Surge protective device.

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1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 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

2.1 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 use.

B. Comply with NFPA 70.

C. RoHS compliant.

D. Comply with NEMA WD 1.

E. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with requirements in this Section.

F. Devices for Owner-Furnished Equipment:

1. Receptacles: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

G. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

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2. Wiring Devices Connected to Essential Electrical System: Red.
3. SPD Devices: Blue.
4. Isolated-Ground Receptacles: Orange.

H. Wall Plate Color: For plastic covers, match device color.

I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A

A. Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.

B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

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2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

D. Tamper- and Weather-Resistant Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.3 USB RECEPTACLES

A. USB Charging Receptacles <**Insert drawing designation**>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
3. USB Receptacles: Dual, USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
4. Standards: Comply with UL 1310 and USB 3.0 devices.

B. Tamper-Resistant Duplex and USB Charging Receptacles:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

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2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Integral shutters that operate only when a plug is inserted in the line voltage receptacle.
3. Line Voltage Receptacles: Two pole, three wire, and self-grounding; NEMA WD 6, Configuration 5-20R.
4. USB Receptacles: Dual USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
5. Standards: Comply with UL 498, UL 1310, USB 3.0 devices, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

2.4 GFCI RECEPTACLES, 125 V, 20 A

A. Duplex GFCI Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-15R.
4. Type: Feed through.
5. Standards: Comply with UL 498 and UL 943 Class A.
6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

2.5 HOSPITAL-GRADE RECEPTACLES, 125 V, 20 A

A. Hospital-Grade, Single Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 Supplement sd and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

B. Hospital-Grade, Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 Supplement sd and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

C. Hospital-Grade, Isolated-Ground, Duplex Receptacles, 125 V, 20 A:

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1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Premise Wiring.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Straight blade; equipment grounding contacts shall be connected only to green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498 Supplement sd and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

D. Hospital-Grade, Tamper-Resistant, Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Premise Wiring.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, and FS W-C-596.
5. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

E. Hospital-Grade, Tamper-Resistant, Duplex (125 V, 20 A) and USB Charging Receptacles:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Leviton Manufacturing Co., Inc.
    c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Integral shutters that operate only when a plug is inserted in the line voltage receptacle.
3. Line Voltage Receptacles: Two pole, three wire, and self-grounding, NEMA Configuration 5-20R.
4. USB Receptacles: Dual, USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
5. Standards: Comply with NEMA WD 1, UL 498 Supplement sd, UL 1310, and FS W-C-596.

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6. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

F. Hospital-Grade, Duplex GFCI Receptacles, 125 V, 20 A <**Insert drawing designation**>:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Single-piece, rivetless, nickel-plated, all-brass grounding system.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498 supplement sd, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

G. Hospital-Grade, Tamper-Resistant, Duplex GFCI Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Premise Wiring.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Single-piece, rivetless, nickel-plated, all-brass grounding system.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498 supplement sd, UL 943 Class A, and FS W-C-596.
6. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

H. Hospital-Grade, Duplex SPD Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

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2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light. With single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
5. Configuration: NEMA WD 6, Configuration 5-20R.
6. Standards: Comply with UL 498 supplement sd, UL 1449, and FS W-C-596.
7. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

2.6 TWIST-LOCKING RECEPTACLES

A. Twist-Lock, Single Receptacles, 120 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Configuration: NEMA WD 6, Configuration L5-20R.
3. Standards: Comply with UL 498.

B. Twist-Lock, Single Receptacles, 250 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Premise Wiring.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Configuration: NEMA WD 6, Configuration L6-20R.
3. Standards: Comply with UL 498.

2.7 PENDANT CORD-CONNECTOR DEVICES:

A. Description: Matching, locking-type plug and receptacle body connector, heavy-duty grade.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Premise Wiring.
2. Leviton Manufacturing Co., Inc.

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3. Pass & Seymour/Legrand (Pass & Seymour).

C. Configuration: NEMA WD 6, Configurations L5-20P and L5-20R, etc.

D. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.

E. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

F. Standards: Comply with FS W-C-596.

2.8 CORD AND PLUG SETS

A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

B. 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.

C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.9 TOGGLE SWITCHES, 120/277 V, 20 A

A. Antimicrobial, Single-Pole Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Eaton (Arrow Hart).
   b. Leviton Manufacturing Co., Inc.

2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
3. Standards: Comply with UL 20 and FS W-S-896.

B. Antimicrobial, Double-Pole Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Eaton (Arrow Hart).
   b. Leviton Manufacturing Co., Inc.

2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
3. Standards: Comply with UL 20 and FS W-S-896.

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C. Antimicrobial, Three-Way Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Eaton (Arrow Hart).
   b. Leviton Manufacturing Co., Inc.

2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
3. Standards: Comply with UL 20 and FS W-S-896.

D. Four-Way Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Standards: Comply with UL 20 and FS W-S-896.

E. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: For use with mechanically held lighting contactors.
3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

2.10 DECORATOR-STYLE DEVICES, 20 A

A. Decorator Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.

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4. Standards: Comply with UL 498.

B. Decorator Tamper-Resistant Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.

C. Decorator, Tamper- and Weather-Resistant, Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

D. Decorator Single-Pole Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Hubbell Incorporated; Wiring Device-Kellems.
   b. Leviton Manufacturing Co., Inc.
   c. Pass & Seymour/Legrand (Pass & Seymour).

2. Comply with UL 20.

E. Decorator, Antimicrobial, Single-Pole Switches, 120/277 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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a. Eaton (Arrow Hart).
b. Leviton Manufacturing Co., Inc.

2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
3. Standards: Comply with UL 20 and FS W-S-896.

2.11 OCCUPANCY SENSORS

A. Wall Switch Sensor Light Switch, Dual Technology:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hubbell Incorporated; Wiring Device-Kellems.
b. Leviton Manufacturing Co., Inc.

2. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
3. Standards: Comply with UL 20.
4. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
5. Adjustable time delay of 20 minutes.
6. Able to be locked to Manual-On mode.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
8. Connections: Integral wireless networking.

B. Wall Sensor Light Switch, Passive Infrared:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hubbell Premise Wiring.
b. Leviton Manufacturing Co., Inc.
c. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.
3. Standards: Comply with UL 20.
4. Connections: Hard wired.
5. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
6. Integral relay for connection to BAS.
7. Adjustable time delay of 20 minutes.
8. Able to be locked to Manual-On mode.
9. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

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2.12 TIMER LIGHT SWITCH

A. Digital Timer Light Switch:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Leviton Manufacturing Co., Inc.

2. Description: Switchbox-mounted, combination digital timer and conventional switch lighting-control unit, with backlit digital display, with selectable time interval in 20-minute increments.
3. Standards: Comply with UL 20.
4. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 hp at 120 V ac.
5. Integral relay for connection to BAS.

2.13 DIMMERS

A. Wall-Box Dimmers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Hubbell Incorporated; Wiring Device-Kellems.
    b. Leviton Manufacturing Co., Inc.
    c. Lutron Electronics Co., Inc.
    d. Pass & Seymour/Legrand (Pass & Seymour).

2. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
3. Control: Continuously adjustable slider; with single-pole or three-way switching.
4. Standards: Comply with UL 1472.
5. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.

    a. 1200 W; dimmers shall require no derating when ganged with other devices. Illuminated when "off."

6. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.14 WALL PLATES

A. Single Source: Obtain wall plates from same manufacturer of wiring devices.

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B. 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: [**Steel with white baked enamel, suitable for field painting**] [**Smooth, high-impact thermoplastic**] [**0.035-inch-thick, satin-finished, Type 302 stainless steel**] [**0.04-inch-thick, brushed brass with factory polymer finish**] [**0.05-inch-thick, anodized aluminum**] [**0.04-inch-thick steel with chrome-plated finish**].
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.

C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

D. Antimicrobial Cover Plates:

1. Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
2. Tarnish resistant.

2.15 PREFABRICATED MULTIOUTLET ASSEMBLIES <**Insert drawing designation**>

A. Description: Two-piece surface metal raceway, with factory-wired multioutlet harness.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Hubbell Incorporated; Wiring Device-Kellems.
2. Wiremold / Legrand.

C. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

D. Raceway Material: Metal, with manufacturer's standard finish.

E. Multioutlet Harness:

1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
2. Receptacle Spacing: 18 inches.
3. Wiring: No. 12 AWG solid, Type THHN copper, single circuit.

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PART 3 - EXECUTION

3.1 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 comply with NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

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.

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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 left.

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, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on inside face of plate, and durable wire markers or tags inside outlet boxes.

C. Essential Electrical System: Mark receptacles supplied from the essential electrical system to allow easy identification using a self-adhesive label.

3.4 FIELD QUALITY CONTROL

A. Test Instruments: Use instruments that comply with UL 1436.

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B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

C. Perform the following tests and inspections:

1. In healthcare facilities, prepare reports that comply with NFPA 99.
2. Test Instruments: Use instruments that comply with UL 1436.
3. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

D. Tests for Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 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.

E. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz..

F. Wiring device will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

END OF SECTION 262726

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SECTION 265619 LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.
3. Luminaire-mounted photoelectric relays.

B. Related Requirements:

1. Section 260923 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaire.
4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.

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5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-80.

    a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
    b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

6. Wiring diagrams for power, control, and signal wiring.
7. Photoelectric relays.
8. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

D. Delegated-Design Submittal: For luminaire supports.

1. Include design calculations for luminaire supports.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Structural members to which equipment and luminaires will be attached.
3. Underground utilities and structures.
4. Existing underground utilities and structures.
5. Above-grade utilities and structures.
6. Existing above-grade utilities and structures.
7. Building features.
8. Vertical and horizontal information.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Product Certificates: For each type of the following:

1. Luminaire.

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2. Photoelectric relay.

D. Product Test Reports: For each luminaire, for tests performed by a qualified testing agency.

E. Source quality-control reports.

F. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and photoelectric relays to include in operation and maintenance manuals.

1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.7 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: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
3. Diffusers and Lenses: One for every 100of each type and rating installed. Furnish at least one of each type.
4. Globes and Guards: One for every 20of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

E. Mockups: For exterior luminaires, complete with power and control connections.

1. Obtain Architect's approval of luminaires in mockups before starting installations.
2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.

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3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including luminaire support components.
b. Faulty operation of luminaires and accessories.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 LUMINAIRE REQUIREMENTS

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. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

Coordinate "FM Global Compliance" Paragraph below with Drawings.

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C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with or IEC 60061-1.

F. Bulb shape complying with ANSI C79.1.

G. CRI of 80. CCT of [**2700 K**] [**3000 K**] [**4100 K**] <**Insert value**>.

H. L70 lamp life of 50,000 hours.

I. Lamps dimmable from 100 percent to 0 percent of maximum light output.

J. Internal driver.

K. Nominal Operating Voltage: 120 V ac.

L. Lamp Rating: Lamp marked for outdoor use.

M. Source Limitations: Obtain luminaires from single source from a single manufacturer.

N. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 LUMINAIRE TYPES

2.4 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

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1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage and coating.
c. CCT and CRI for all luminaires.

2.5 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

a. Color: As selected from manufacturer's standard catalog of colors.
b. Color: Match Architect's sample of manufacturer's standard color.
c. Color: As selected by Architect from manufacturer's full range.

2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

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 luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, for suitable conditions where luminaires will be installed.

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D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Install lamps in each luminaire.

C. Fasten luminaire to structural support.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Wall-Mounted Luminaire Support:

1. Attached using through bolts and backing plates on either side of wall.

F. Wiring Method: Install cables in raceways. Conceal raceways and cables.

G. Install luminaires at height and aiming angle as indicated on Drawings.

H. Coordinate layout and installation of luminaires with other construction.

I. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.4 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

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B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

B. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):

   a. IES LM-5.
   b. IES LM-64.

2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

C. Luminaire will be considered defective if it does not pass tests and inspections.

D. 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.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

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1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265619

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SHEET NOT IN USE.

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SECTION 31 11 00 CLEARING AND GRUBBING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for conducting clearing and grubbing operations within the project limits from right-of-way line to right-of-way line. For the purpose of this Item, the project limits shall include roadways, roadside ditches, channels, outfall ditches, detention ponds, and other drainage facilities, temporary and permanent easements and other areas as shown on the drawings.

B. Clearing shall consist of removing all trees, brush, overhangs, logs, tires, appliances, trash, rubbish and other debris, including any deleterious materials, that exist within the limits of the project.

C. It shall be the responsibility of the Contractor to visit the project site and ascertain the clearing and grubbing requirements as included in the bid documents prior to submitting a bid on the project. Any necessary trimming of overhangs that encroach into the right-of-way and interfere with the facilitation of construction or the operation or maintenance of the executed project shall be required and will not be paid for separately.

PART 2 - EXECUTION

2.1 CONSTRUCTION METHODS

A. The project limits shall be cleared of all trees, brush, stumps, overhangs, logs, rubbish, shrubs, and other trash. Items and certain areas designated by the Engineer for preservation shall be carefully protected from abuse, marring or damage during construction operations and preserved in accordance with the bid documents.

B. Parking and/or servicing of equipment or stockpiling of construction materials within 3 feet of the drip line of trees designated for preservation, will not be permitted.

2.2 DISPOSAL OF MATERIAL

A. All cleared and grubbed materials shall be disposed of offsite. No burning shall be allowed unless otherwise noted.

2.3 LIMIT OF OPERATION

A. No clearing or grubbing shall be done outside the Project limits or the right-of-way. Any work done outside the Project limits or the right-of-way limits, for any purpose, shall be done at the Contractor's expense and it shall be the Contractor's responsibility to negotiate and secure the permission of the property owner for such operation.

2.3 MEASURES & PAYMENT

A. Clearing and grubbing will be paid per lump sum as designated in the proposal and/or drawings, and shall be full compensation for furnishing all labor, materials, permits, supervision, equipment and supplies required to complete all items of work specified herein.

END OF SECTION 31 11 00

SECTION 31 13 13.13 REMOVING AND DISPOSING OF EXISTING WASTE MATERIAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item govern for the removing and disposing of existing waste material of all types of outside the project limits in compliance with current local, State and Federal Regulations.

1.2 CONSTRUCTION METHODS.

A. The existing materials shall be removed to the location directed by the Engineer. The surface and base material (all depths) shall be removed in such a manner as not to disturb the subgrade.

1.3 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 31 13 13.13

SECTION 31 20 00 EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete earthwork required in these specifications and on the drawings.

1.2 RELATED WORK

A. Section 31 11 00 Clearing and Grubbing.
B. Section 31 41 00 Trench Safety.
C. Section 32 91 19.13 Topsoil.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
1. D422-63 Standard Test Method for Particle Size Analysis of Soils.
2. D4318 Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
3. D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
4. D1140 Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing.
5. D1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
6. D2922 Standard Test Methods for Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).
7. D3017 Standard Test Method for Water Content of Soil and Rock In-Place by Nuclear Methods (Shallow Depth).
8. D4253 Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
9. D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
10. D6913 Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
11. E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.4 QUALITY ASSURANCE

A. The Contractor shall conduct sampling, testing, and analysis as required by this section and elsewhere in the Contract Documents either by retaining the services of an independent construction materials testing consultant or with internal certified testers. The materials testing personnel shall meet the requirements of ASTM E329.

1.5 QUALITY ASSURANCE

A. Provide samples of each type of soil or aggregate proposed for use on the project. Samples shall consist of a minimum of 50 pounds of soil.

B. Provide copies of all material testing reports completed for the project within 48 hours of completing the individual tests.

1.6 QUANTITIES

A. Finished topsoil depth shall be as specified in Section 32 9119.13 Topsoil or as shown on the drawings.

B. Contractor shall be solely responsible for determining all earthwork quantities based on the existing and proposed elevations provided on the drawings. Any geotechnical investigations provided by the Owner apply only to those locations that the data was collected and may not be indicative of conditions elsewhere on the site. The Contractor is responsible for collecting any additional geotechnical or survey data he deems necessary to complete an accurate estimate of earthwork quantities.

C. If onsite grading, excavation and borrow operations do not provide enough suitable material for fill areas, Contractor shall coordinate and pay for excavation, transport and placement of imported material meeting the specifications of the contract documents. If excavation results in excess materials, Contractor shall coordinate and pay for loading, transport and offsite disposal of excess materials.

D. Contractor shall notify the Engineer immediately if geotechnical information, existing grades, or proposed grades shown on the drawings appears to be inaccurate.

PART 2 - PRODUCTS

2.1 EARTH FILL

A. Use clean material consisting of inorganic soil or a mixture of inorganic soil and rock, stone or gravel. The material shall be free of topsoil, sod, stumps, wood, asphalt, concrete, debris, and other deleterious material.

PART 3 - EXECUTION

3.1 GENERAL

A. Complete earthwork excavation for elevation changes, utility trenches, minor structures and building foundations in accordance with this section and the following applicable sections:
1. Section 31 4100 Trench Safety.

3.2 TOPSOIL REMOVAL

A. Complete clearing and grubbing work as required by the Contract Documents and as specified in Section 31 1100 Cleaning and Grubbing.

B. Coordinate topsoil stockpile locations with Engineer and Owner.

C. Remove all topsoil from proposed locations of buildings, structures, roads, walks and other paved areas. Also, remove topsoil from proposed lawn or turf areas where the proposed elevation exceeds the existing elevation by 1' or greater, or where fill will be placed.

D. Stockpile reusable topsoil for use in restoration. Salvaged topsoil shall not be removed from the site without prior approval of the Engineer.

E. Do not excavate, grade or work topsoil in frozen or muddy condition.

F. Minimize compaction of topsoil to the extent possible.

3.3 EXCAVATION

A. Excavate to the elevations shown on the drawings. Allow for placement of fill, base course, pavements, and topsoil as required by the drawings and other Contract Documents.

B. Transfer lines and grades as shown on the drawings.

C. Excavate areas to provide positive drainage. Contractor shall notify the Engineer immediately if the final proposed elevations shown on the drawings do not provide drainage away from buildings, structures, roads, walks and other paved areas.

D. Remove excess and spoil material from the site in a timely fashion.

E. Do not excavate below design grades without prior authorization by the Engineer.

3.4 PLACING AND COMPACTING MATERIAL

A. Place material in fill areas only after all topsoil has been removed.

B. Place fill to the elevations shown on drawings; allow for placement of base course, pavements and topsoil as required by the drawings and other Contract Documents.

C. Do not place fill on areas consisting of organic soil, debris or soft and yielding material.

D. Do not place fill on frozen or muddy areas.

E. Moisture condition subgrade as necessary to provide a firm surface prior to placing fill.

F. Moisture condition fill material as necessary to achieve density required for given use.

G. Place and compact backfill so as to minimize settlement and avoid damage to walls, utility lines and other work in place. Place backfill simultaneously on both sides of free-standing structures.

H. It is the responsibility of the Contractor to provide all necessary compaction equipment and other grading equipment that may be required to obtain the specified compaction. Compaction of controlled backfill by travel of grading equipment will not be considered adequate for uniform compaction. Hand guided vibratory or tamping compactors will be required whenever controlled backfill may be placed adjacent to walls, footings, and columns or in confined areas.

3.5 GRADING

A. Grading shall include areas necessary to establish new grades as required, additional areas disturbed by construction activities, storage, equipment including all trenching, where excess fill is deposited and where cutting is required.

B. New grades are designed to produce desired configuration of site and do not represent a balance between cut and fill.

C. Excavated materials shall be disposed of by contractor at a suitable off-site location. Contractor shall be responsible for securing suitable disposal site(s) and for all off-site disposal costs.

D. Grades not indicated shall be uniform levels or slopes between point elevations as shown. Adjust all grades as necessary to provide positive drainage away from structures.

E. Grades for earthwork shall not deviate from established elevations, as shown in excess of 1 inch unless otherwise directed by Engineer.

F. Do all cutting, filling, compacting fill, rough grading required to bring entire project to within respective base course elevations or 6 inches below finished topsoil elevations.

3.6 GRADING AROUND TREES

A. Limit excavation, filling and grading near trees or other vegetation to the extent possible. When tree roots are encountered, cut roots cleanly and squarely.

B. For trees within the grading limits that are to remain, install tree protection barrier as noted in the drawings.

3.7 CLEAN UP

A. Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.

B. Thoroughly clean all drainage ways, roads, parking lots, sidewalks, and paved surfaces and remove and dispose of all debris and mud.

END OF SECTION 31 20 00

SECTION 31 23 00 CONSTRUCTION OF UNDERGROUND UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Section shall govern for all excavation required for the construction of sewers, sewer structures, pipe culverts, appurtenances and connections and for the backfilling around completed sewers to the level of the original ground, all in conformity with the locations, lines and grades shown on the plans or as given by the Engineer and in accordance with these specifications. This Section shall also govern for any necessary pumping or bailing and drainage and all sheathing and bracing of trench walls. Also governed by this Section are the cutting and restoration of pavement and base courses, the furnishing and placing of cement stabilized backfill, the hauling and disposing of surplus materials and the bridging of trenches and other provisions for maintenance of traffic or access as provided herein.

1.2 QUALITY ASSURANCE

A. The Testing Laboratory's representative will determine the moisture density relationship in accordance with ASTM D698 on material secured from the trench excavation. Samples secured from the cement stabilized sand supplier shall be blended with Portland cement in accordance with Section 31 2323.16 - Cement Stabilized Sand Bedding and Backfill, and the moisture density relationship will be determined in accordance with ASTM D558.

B. The Testing Laboratory's representative will determine the in place density in accordance with ASTM Methods D2922 or D1556. The minimum level of testing will consist of at least one test for each 100 linear feet of trench per lift of backfill.

1.3 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS

2.1 TESTING

A. Gravity sanitary sewer lines shall be "lamped". No sewer line shall be accepted, unless a clear lamp can be seen from manhole to manhole.

PART 3 - EXECUTION

3.1 EXCAVATION & TRENCH PREPARATION

A. Excavate trench to the alignment and depth required. Brace the trench and drain, as required, so that the work may be accomplished safely and efficiently. If necessary, install a dewatering system to provide a dry trench bottom. Pumps shall discharge into natural drainage channels or to drains. Shoring for excavations and trenches shall meet the requirements of the latest edition of OSHA Regulation 1926, Subpart P.

B. For pipes less than 30 inches in diameter, the minimum width of the trench shall be the width of the outside barrel of the pipe plus 24 inches, the maximum width of the trench shall be the width of the outside barrel of the pipe plus 36 inches. For pipe 30 inches and larger, the minimum trench width shall be the width of the outside barrel of the pipe plus 36 inches, and the maximum width of the trench shall be the width of the outside barrel of the pipe plus 48 inches.

C. Side sloping or benching of the trench, where permitted, will begin at one foot above the top of the pipe and will not encroach upon private property or endanger existing or future structures or underground utilities. Depth of trench, without sheeting or bracing shall comply with OSHA Regulation 1926.650.

D. The full width of the trench shall be excavated to a depth below the invert elevation of the pipe so as to permit placing the bedding material specified on the Standard Civil Drawings below the outside bottom of the pipe. Any additional depth excavated by the Contractor shall be replaced with an equal depth of cement stabilized sand. The cost of this additional material, in place shall be at the expense of the Contractor

E. Where necessary, excavations shall have sheeting and bracing to prevent caving. At these locations, increase the trench width as required and leave the sheeting in place until the pipe has been laid and the backfill compacted to a depth of 2 feet over the pipe. Sheeting and bracing shall be in accordance with the Item 435 "Timber Ordered Left in Trench". All sheeting and bracing shall be designed to the requirements of OSHA Standard 1926, Subpart P (Latest Edition).

F. Sewers shall not be constructed or sewer pipe laid in the presence of water. All water shall be removed from the excavation sufficiently prior to the sewer placing operation to insure a dry, firm bed on which to place the sewer and shall be maintained in such unwatered condition until all concrete, cement stabilized sand, and mortar are cured. Removal of water may be accomplished by bailing, pumping or by a well point system as conditions warrant. The well point installation shall be in accordance with the Item 436 "Well Pointing". A seal slab shall be installed when Well Pointing is used for dewatering.

G. In the event that the excavation cannot be dewatered to the point where the pipe subgrade is free of mud, excessive wet soil, sand silt or clay with water, a seal slab shall be used in the bottom of the excavation. Such seal slab shall consist of a lean concrete mixture. The seal slab shall be a Class "D", 5 sacks of cement per cubic yard with a minimum compressive strength of 1,750 P.S.I. at 7 days and 2,500 P.S.I. at 28 days. A precast seal slab may be used, provided that the joints of the seal slab do not occur at the joint of the pipe. Contractor shall have an option of using a three-day cylinder break test at no expense to the Owner.

H. For unstable conditions requiring outside forms, seals, sheathing, and bracing, or where groundwater is encountered, any additional excavation in width and backfill required shall be done at the Contractor's expense. Portable trench boxes may be used in lieu of sheathing upon approval in writing by the Engineer. The trench box must be in accordance with OSHA Regulation 1926.650 (latest edition).

I. Use of the trench box does not relieve the Contractor of any liability for damages to person or property. When a trench box is moved, the jointed pipe or in-place backfill shall not be disturbed.

J. All materials from excavation operations not required for backfilling, if considered suitable shall be placed in embankments or wasted, in accordance with Section 31 2000 - Earthwork. All material not suitable for use in embankments will be declared surplus by the Engineer and shall become the responsibility of the Contractor to dispose of as he wishes. Such surplus material shall be promptly removed from the work following the completion of the portion of the sewer involved. No separate payment shall be made for disposal of this surplus material.

K. Unless otherwise specifically approved, Contractor shall use ladder or wheel-type trench-digging machinery, except where hand methods must be employed to avoid damage to existing structures above or below ground, or where hand excavation is indicated.

L. Engineer may limit the amount of trench opened or partially opened at any time in advance of the completed pipe laying operation and the amount of trench left unfilled. Open no more than 500 feet of trench at any one time.

3.2 PIPE LAYING

A. No pipe shall be laid in water or when the trench conditions or weather is unsuitable for such work, unless specifically approved by the Engineer.

B. Fit and lay the pipe to form a smooth and uniform invert. Laying of pipe shall commence at the lowest point, so that the spigot ends point in the direction of flow.

C. All other types of pipe shall be laid in accordance with the applicable provisions of this specification.

D. Field cutting of Polyvinyl Chloride shall be in accordance with the pipe manufacturer's recommendations.

E. Minor deflections may be obtained in pipe joints. Contractor must obtain approval when the degree of deflection is necessary to deflect from a straight line. Where necessary to make major deflections in concrete pipe, use sections of pipe with beveled ends for deflections not greater than five degrees. For deflections greater than five degrees, use fabricated fittings for concrete pressure pipe and use cast iron fittings for cast iron pipe.

F. When the pipe laying operation is halted, seal the open end of the pipe with a temporary plug. Plug is to remain in place until the pipe laying operation re-commences. Standard plugs shall be inserted into bells of all dead end pipe.

3.3 BACKFILLING

A. As soon as practicable after completion of laying and jointing of pipe, backfill the trench. Not more than 200 feet of the trench shall be left open after laying the pipe.

B. Trenches shall be backfilled with material selected from sewer trench excavation, or obtained from other sources, shall be free from stones, which will interfere with compaction and free of large lumps, which will not break down readily under compaction. Do not use material excavated in large lumps which will not break down or which cannot be spread in loose layers. Material excavated by trenching machine will generally be suitable for use as backfill. Cement stabilized sand shall be in accordance with Section 31 2323.16 - Cement Stabilized Sand Bedding and Backfill.

C. In the pipe zone, as shown on the drawings, cement stabilized sand placed to the depth shown by those drawings, deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to the height shown by those drawings. Moisten if necessary and tamp in approximately 6 inch layers, thoroughly compacting under and on each side of the pipe to provide solid backing against the external surface of the pipe. Walking or working on the completed pipeline, except as necessary in tamping or backfilling, shall not be permitted until the trench has been backfilled to at least 12 inches over the top of the pipe.

3.4 RESTORATION OF SURFACES

A. Replace or repair sidewalks, driveway culverts, inlets, curbing, gutters, shrubbery, trees, fences, sod and other like obstructions removed or disturbed, to the condition equivalent to that

existing prior to commencement of this work. Use concrete having a compressive strength of not less than 3,000 psi in 28 days for the replacement of curbing, gutters, inlets and sidewalks.

B. Use reasonable care in the removal and replacement of shrubbery and trees designated to be replaced at original locations. Where at all possible, ditch alignment will be such as to minimize this work. The restoration of asphalt topped flexible base and concrete streets shall be as specified under other items of the specifications.

3.5 CLEAN-UP

A. The Contractor shall remove from the site of the work and from public and private property temporary structures, rubbish, and waste materials, including excess excavated materials. The Contractor is responsible for disposing of all surplus earth. The pipe laying operation shall be temporarily suspended if the clean-up is falling behind as determined by the Engineer or Owner.

END OF SECTION 31 23 00

SECTION 31 23 23.13 BANK SAND BACKFILL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section shall govern for the furnishing, installing, manipulation, compacting and completing in place, Bank Sand as a bedding and backfill material for water and sewer lines, as construction fill for certain excavation areas, as construction fill for ruts, holes and other similar conditions; as a fill material for project clean-up and as directed by the Engineer. Bank sand shall be in accordance with these specifications and in conformity with the lines, grades and cross-sections shown on the plans and as directed by the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bank sand is to be free of organic matter, foreign material, clay balls, sticks, foreign objects and other objectionable material.

B. Bank sand shall have a plasticity index less than 3 and shall meet the following gradation:

SIEVE SIZE	% PASSING, BY WEIGHT
3/8 Inch	100
No. 200	5 – 30

C. Prior to use, contractor shall identify the source of the proposed bank sand for testing.

PART 3 - EXECUTION

3.1 CONSTRUCTION

A. After the water line, sewer line or other similar construction item, such as a trench, has been excavated and brought to grade, bank sand shall be furnished, placed, compacted complete in place, either as bedding or backfill material, as shown on the plan, described in these Standard Specifications or as directed by the Engineer. After the trench or excavation has been brought to grade, the bank sand shall be placed and compacted as a bedding material, the construction item shall be placed and joined properly around and over that construction item as required and as shown on the plans, described in the specifications or directed by the Engineer.

B. Bank sand shall be placed in layers not exceeding 8 inches. It shall be compacted with mechanical vibratory tamps to maximum dry density in accordance with ASTM D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)" at a moisture content ranging from optimum to three percentage points above optimum. Water flooding will not be permitted.

3.2 TESTING

A. The Testing Laboratory's representative will determine the moisture density relationship for each material proposed for use as backfill, in accordance with ASTM D698. In place density will be determined in accordance with ASTM D6938 "Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods" or ASTM D1556 "Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method," and with each type of construction.

3.3 MEASUREMENT

A. No separate payment shall be made for work performed under this Item, except as indicated below. Include the cost of same in the price bid per linear foot of pipe, or wall, for which this work is a component.

END OF SECTION 31 23 23.13

SECTION 31 23 23.16 CEMENT STABILIZED SAND BEDDING AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for cement stabilized sand to be used for backfill and bedding as called for on the Standard Civil Drawings, in other parts of the Standard Specifications, or as directed by the Engineer.

1.2 PERFORMANCE

A. The sand cement mixtures shall produce a minimum unconfined compressive strength of 100 psi in 48 hours, when compacted to ninety five percent (95%) of Standard Proctor density (ASTM Method D558), without additional moisture control and when cured in plastic bags at a temperature of 73.4º F at plus or minus 3º F and tested in accordance with ASTM D1633.

B. Random samples of the delivered product will be taken in the field at the direction of the Engineer and tested at the Owners expense.

1.3 NOTIFICATION.

A. The Testing Laboratory's representative will notify the County, Engineer, Contractor and material supplier by facsimile of all tests indicating results falling below specified strength requirements.

1.4 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement shall be Type I Portland cement conforming to ASTM C150. Sand shall be clean durable sand containing not more than the following:

1. Deleterious Materials:
   a. Clay lumps, when tested in accordance with ASTM C142 shall be less than 0.5 percent. Lightweight pieces, when tested in accordance with ASTM C123 shall be less than 5.0 percent.
   b. Organic impurities when tested in accordance with ASTM C40 shall not show a color darker than the standard color.
2. The plasticity index shall be six (6) or less when tested in accordance with ASTM D4318.
3. Sand shall be free of organic matter and deleterious substances and shall meet the following gradation requirement.

SIEVE SIZE	% Passing, By Weight
3/8 Inch	100
No. 200	5 – 30

4. Water shall be clean and clear, free of oils, acids, alkalis, organic matter or other deleterious substances and shall conform to the requirements of ASTM C1602.

2.2 SAND-CEMENT MIXTURE PRODUCT

A. The mixture shall consist of not less than 1.5 sacks of Portland cement per ton of material mixture as placed. The mixture shall contain sufficient water to hydrate the cement.

B. The cement, sand and water shall be mixed in a pug mill type mixer, which meets the approval of the Engineer. It shall be mixed for a minimum period of two minutes per batch.

PART 3 - EXECUTION

3.1 APPLICATION

A. The sand cement mixture shall be placed in maximum eight (8) inch thick lifts, loose measure, and thoroughly rodded and tamped around the pipe, boxes, structures, and paving sections. Placement and compaction shall be performed in a manner that will thoroughly fill all voids without placing undue strain on or displacement of the structure.

B. Cement stabilized sand backfill below the top of sewers, manholes, inlets or other structures shall be placed equally along all sides of the structure. Cement stabilized sand backfill/bedding shall be placed in a manner that will completely fill all voids in the trench. Hand operated tampers may be used for compaction.

C. Materials not placed and compacted within four (4) hours after mixing shall be rejected. Do not place or compact sand-cement mixtures in standing or free water.

D. Cement stabilized sand bedding and backfill placed in trenches shall be compacted I accordance to Section 31 2300 Construction of Underground Utilities.

E. In-place density tests shall be taken at each location, each day, to test the placement of bedding/backfill material as directed by the Engineer. In-place densities shall be determined in accordance with ASTM D6938 or ASTM D1556.

END OF SECTION 31 23 23.16

SECTION 31 32 13.17 CEMENT STABILIZED SUBGRADE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall consist of treating the subgrade by the pulverizing, the addition of Portland cement, mixing, wetting and compacting the mixed material to the required density. This item applies to natural ground, embankment or existing pavement structure and shall be constructed as specified herein and in conformity to the typical sections, lines and grades as shown, on the plans or as established by the Engineer.

B. Cement treatment shall not be mixed or placed when the air temperature is below 40° F and falling, but may be mixed or placed when the air temperature is above 35° F and is rising, the temperature being taken in the shade and away from artificial heat and with the further provision that cement treatment shall be mixed or placed only when weather conditions, in the opinion of the Engineer, are suitable.

1.2 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Soil shall consist of approved material free from vegetation or other objectionable matter encountered in the existing roadbed and other acceptable material used in the preparation of the roadbed in accordance with this specification.

B. Portland cement shall be Type I of a standard brand of cement and shall conform to the requirements of ASTM Designation C150. The Contractor, at his option, may use bulk cement, provided the apparatus for handling, weighing and spreading the cement is approved by the Engineer.

C. Water shall be free from substances deleterious to the hardening of the cement treatment and shall meet the requirements of Section 32 1313 Concrete Pavement.

The ratio of cement to soil shall be based on dry weight of the soil/cement mixture and shall be established by the Engineer in the field to provide the desired stability. The cement content in the dry material normally ranges between 6 percent to 10 percent by weight. The percentage of moisture in the soil, at the time of the cement application shall not exceed the quantity that will permit the uniform and intimate mixture of soil and cement during the dry mixing operations and shall not exceed the specified optimum moisture content for the soil cement mixture, as determined by ASTM D558.

2.2 EQUIPMENT

A. Equipment necessary for proper construction of the work shall be on the project, in first-class working condition and be approved by the Engineer, both as to type and condition, prior to the start of construction operations. The Contractor shall at all times provide sufficient equipment to enable continuous prosecution of the work.

B. Portland cement treatment for materials in-place may be constructed with any machine or combination of machines and auxiliary equipment that will produce the results as outlined in this specification.

C. Mixing may be accomplished by a multiple-pass traveling mixing plant or a single-pass traveling mixing plant.

D. The equipment provided by the Contractor shall be operated by experienced and capable workmen and shall be that necessary to provide a cement treatment meeting the requirements herein specified.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. It is the primary requirement of this Item to secure a completed course of treated material containing a uniform portland cement mixture free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his work, to process a sufficient quantity of material to provide full depth as shown on the plans, to use the proper amount of portland cement, maintain the work and rework the courses as necessary to meet the above requirements.

B. The Portland cement shall be mixed to the full depth shown on the plans and in no case, shall it be less than 6 inches.

C. The subgrade shall be firm and able to support, without displacement, the construction equipment at the density hereinafter specified. Soft or yielding subgrade shall be corrected and made stable by scarifying and aeration or adding cement and compacting until it is of uniform stability.

D. Before other construction operations are begun, the subgrade shall be graded, shaped and compacted, as required, to construct the Portland cement treatment for materials in-place in conformance with the lines, grades, thickness and typical cross section shown on the plans. Unsuitable soil or material shall be removed and replaced with acceptable material.

E. The soil shall be so pulverized that, at the completion of moist-mixing 100-percent by dry weight passes a 1-inch sieve, and a minimum of 80-percent passes a No. 4 sieve, exclusive of gravel or stone retained on these sieves. Old bituminous wearing surfaces shall be pulverized so that 100 percent will pass a 1-3/4 inch sieve as per Table 1 below:

SIEVE SIZE	BASE	SUBGRADE
1-3/4 Inch	100	100
3/4 Inch	85	85
No. 4	-	60

F. Portland cement shall be spread uniformly on the soil at the rate specified or as approved by the Engineer. If a bulk cement spread is used, it shall be positioned by string lines or other approved methods during spreading to insure a uniform distribution of cement.

G. Cement shall be applied only to such an area that all operations can be continuous and completed in daylight and within 5 hours of such application.

H. The percentage of moisture in the soil at the time of cement application, shall not exceed the quantity that will permit uniform and intimate mixture of the soil and cement during dry mixing operations, and it shall not exceed the specified optimum moisture content for the soil cement mixture.

I. No equipment, except that used in spreading and mixing, will be allowed to pass over the freshly spread cement, until it is mixed with the soil.

J. After the cement has been applied, it shall be dry mixed with the soil. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied. Any mixture of soil and cement that has not been compacted and finished shall not remain undisturbed for more than 30 minutes.

K. Immediately after dry mixing of soil and cement is complete, water as necessary shall be uniformly applied and incorporated into the mixture. Pressurized equipment shall provide an adequate supply to insure continuous application of the required amount of water to the sections being processed within 3-hours of the application of the cement. Proper care shall be exercised to insure proper moisture distribution at all times. After the last increment of water has been added, mixing shall continue until a thorough and uniform mix has been obtained.

L. The material shall be compacted to not less than 95-percent of standard proctor density (ASTM D698). At the start of compaction, the percentage of moisture in the mixture and in the un-pulverized soil lumps, based on dry weights, shall not be below or more than two percentage points above the specified optimum moisture content and shall be less than that quantity which will cause the soil cement mixture to become unstable during compaction and finishing. When the uncompacted soil cement mixture is wetted by rain so that the average moisture content exceeds the tolerance given at the time of final compaction, the entire section shall be reconstructed in accordance with this specification at the sole expense of the Contractor.

M. The specified optimum moisture content and field density shall be determined from representative samples of the soil, taken in the fields and blended cement in a materials laboratory setting in accordance with ASTM Method D698.

N. Prior to the beginning of compaction, the mixture shall be in a loose condition for its full depth. The loose mixture shall then be uniformly compacted to the specified density lines and grades.

O. After the soil and cement mixture is compacted, water shall be uniformly applied, as needed, and thoroughly mixed. The surface shall then be reshaped to the required lines, grades and cross section and then lightly scarified to loosen any imprint left by compacting or shaping equipment.

P. The resulting surface shall be thoroughly rolled with a pneumatic tire roller and "skinned" by a power grader to achieve final grade, removing all loosened soil and cement from the section. The surface shall then be thoroughly compacted with the pneumatic roller, adding small increments of moisture as needed during rolling. If aggregate larger than a No. 4 screen is present in the mixture, one complete coverage of the section with the flat wheel roller shall be made immediately after the skinning operation. When directed by the Engineer, surface finishing methods may be varied from this procedure, provided a dense uniform surface, free of surface compaction planes, is produced. The moisture content of the surface material must be maintained at its specified optimum during all finishing operations. Surface compaction and finishing shall proceed in such a manner as to produce, in not more than 2-hours, a smooth, closely knit surface, free of cracks, ridges or loose material conforming to the crown, grade and line shown on the plans.

3.2 CURING

A. After the cement treated course has been finished as specified herein, the surface shall be protected against rapid drying by either of the following curing methods for a minimum period of 3-days, or as directed by the Engineer. These methods of curing are:

1. Maintain in a thorough and continuously moist condition by sprinkling.
2. Apply an asphalt membrane to the treated course, immediately after its completion. The material for the asphalt membrane shall be MC-30. The asphaltic material shall meet the requirements of Item 300, "Asphalt Oils and Emulsions" contained in the Texas Highway Department; "Standard Specifications for Construction of Highways, Streets and Bridges," Latest Edition. The quantity and type of asphalt approved for use by the Engineer shall be sufficient to completely cover and seal the total surface of the base and fill all voids. If the Contractor elects to use this method, it shall be his responsibility to protect the asphalt membrane from being picked up by the traffic. The asphalt membrane may remain in-place when the proposed surface or base courses are placed. The surface or other base courses may be applied on the finished base as soon after completion as operations will permit.

3.3 CONSTRUCTION JOINTS

A. At the end of each day's construction a straight transverse construction joint shall be formed by cutting back into the total width of completed work to form a true two-inch depth vertical face free of loose and shattered material.

B. Cement treatment for large wide areas shall be built in a series of parallel lanes of convenient length and width meeting the approval of the Engineer.

3.4 TRAFFIC

A. After the 3 day curing period, or as directed by the Engineer, completed sections of cement treated material in-place, may be opened immediately to local traffic and to construction equipment and to all traffic after the curing period, provided the cement treated course has hardened sufficiently to prevent marring or distorting the surface by equipment or traffic.

3.5 MAINTENANCE

A. The Contractor shall be required, within the limits of his contract, to maintain the cement treated course in good condition until all work has been completed and accepted. Maintenance shall include immediate repairs to any defects that may occur. This work shall be done by the Contractor at his own expense and repeated as often as may be necessary to keep the area continuously intact. Faulty work shall be replaced for the full depth at treatment. It is the intent of this specification that the Contractor construct the plan depth of cement treatment in one homogenous mass. The addition of thin stabilized layers will not be permitted in order to provide the minimum specified depth.

3.6 QUALITY ASSURANCE

A. The Testing Laboratory's representative will determine the Moisture-Density Relationships in accordance with ASTM D698 on material secured from the roadway. Samples will be blended with Portland cement for each type of material encountered.

B. The Testing Laboratory' representative will determine the in-place density in accordance with ASTM D6938 or D1556. The minimum level of testing will consist of at least three tests for each 1,000 feet per lane of roadway or 4,000 square feet (500 square yards) of embankment.

3.7 MEASUREMENT

A. The work performed and the material furnished as prescribed by this item will be measured as follows:

1. Manipulation of cement during stabilization of the subgrade will be measured by the square yard of surface area of the completed and accepted work in-place.
2. Portland cement will be measured by the ton of 2,000 pounds.

END OF SECTION 31 32 13.17

SECTION 31 32 13.19 LIME STABILIZED SUBGRADE

PART 1 - GENERAL

1.1 DESCRIPTION

A. This item shall consist of treating the subgrade, by the pulverizing, addition of lime, mixing and compacting the mixed material to the required depth and density, and in the amounts shown on the plans.

1.2 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish uncontaminated lime of uniform quality that meets the requirements of the plans and specifications. Notify the Engineer in writing of the proposed lime source and of any proposed change in lime source. The Contractor shall obtain verification from the Engineer that the specification requirements are met before using the lime source. The Engineer may sample and test lime or lime/subgrade mixture at any time before compaction.

1. Lime. Furnish lime that meets the requirements of TxDOT's DMS6350 "Lime and Lime Slurry," and DMS-6330, "Lime Sources Prequalification of Hydrated Lime and Quicklime." Use hydrated lime slurry as shown on the plans.
2. Water. Furnish water free of industrial wastes and other objectionable material.
3. Asphalt. When permitted for curing purposes, furnish asphalt or emulsion in accordance with TxDOT's Item 300, "Asphalts, Oils, and Emulsions," as shown on the plans or as directed.
4. Mix Design. The Engineer shall determine the target lime content and optimum moisture content in accordance with ASTM D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))" or based upon prior experience with the project materials. The Contractor may propose an alternative mix design developed in accordance with ASTM D698. The Engineer shall use ASTM D698 to verify the Contractor's proposed mix design before accepting it. The Contractor shall reimburse the County for any and all expenses incurred due to a request by the Contractor to change of mix designs or partial designs, material sources, etc. whether they are approved or not.

2.2 EQUIPMENT

A. Machinery, tools and equipment necessary for proper execution of the work shall be on the project and approved by the Engineer prior to the beginning of construction operations. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. Construct each layer uniformly, free of loose or segregated areas and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

1. Preparation of Subgrade for Treatment. Shape the subgrade in accordance with Item 205 "Subgrade", and applicable bid items to conform to typical sections shown on the

plans and as directed.

2. Pulverization. The Contractor shall pulverize or scarify the existing raw subgrade to allow penetration of the lime to the required depth.

3. Application of Lime. Uniformly apply lime using slurry placement as shown on the plans or as directed. Add lime at the percentage determined in Section 220.2.D, "Mix Design" above. Apply lime only on an area where mixing can be completed during the same working day.

   Start lime application only when the air temperature is at least 35°F and rising or is at least 40°F. The temperature shall be taken in the shade and away from artificial heat. Suspend application when the Engineer determines that weather conditions are unsuitable.

   Slurry Placement. Provide slurry free of objectionable materials, at or above the approved minimum dry solids content, and with a uniform consistency that shall allow ease of handling and uniform application. Deliver commercial lime slurry to the jobsite or prepare lime slurry at the jobsite, or other approved location, by using hydrated lime as specified.

   Distribute slurry uniformly by making successive passes over a measured section of subgrade until the specified lime content is reached.

4. Mixing. Begin mixing within 6 hours of application of lime. Hydrated lime exposed to the open air for 6 hours or more between application and mixing, or that experiences excessive loss due to washing or blowing, shall not be accepted for payment.

   Thoroughly mix the subgrade and lime using approved equipment. Allow the mixture to mellow for 1 to 4 days, as directed. Sprinkle the treated materials during the mixing and mellowing operation, as directed, to achieve adequate hydration and proper moisture content. After mellowing, resume mixing until a homogeneous, friable treated subgrade is obtained.

   After mixing, the Engineer shall sample the mixture at roadway moisture and test in accordance with Tex-101-E, Part III to determine compliance with the following table.

GRADATION REQUIREMENTS (MINIMUM % PASSING)

SIEVE SIZE	TREATED SUBGRADE
1-3/4 Inch	100
3/4 Inch	85
No. 4	60

5. Compaction. Compact the treated subgrade using density control. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. When necessary, sprinkle the treated subgrade as directed. Determine the moisture content of the treated subgrade at the beginning and during compaction in accordance with ASTM D698.

   Begin rolling longitudinally at the sides and proceed toward the center, overlapping on successive trips by at least one-half the width of the roller unit. Offset alternate trips of

the roller. Operate rollers at a speed between 2 and 6 MPH, as directed.

6. Reworking a Section. When a section of lime treated subgrade is reworked within 72 hours after completion of compaction, rework the section to provide the required density. When a section is reworked more than 72 hours after completion of compaction, add additional lime at 25% of the percentage determined in Section "Mix Design" at no additional cost to the County. Reworking includes loosening, adding lime or removing unacceptable treated subgrade if necessary, mixing as directed, compacting, and finishing. Determine a new maximum density of the reworked treated subgrade in accordance with ASTM D698, and compact to at least 95% of this density.
7. Finishing. Immediately after completing compaction of the final layer of lime treated subgrade, clip, skin, or tight-blade the surface to a depth of approximately ¼ in. Remove the clipped material and dispose of it at an approved location. Roll the clipped surface immediately with a pneumatic tire roller until a smooth surface is attained. Add small amounts of water as needed during rolling. Shape and maintain the layer and surface in conformity with the typical sections, lines, and grades shown on the plans or as directed. The treated subgrade shall be finished within the tolerances required by TxDOT's Item 132.3.6.1, "Grade Tolerances."
8. Curing. Cure for the minimum number of days shown in Table 2 by sprinkling as per TxDOT's Item 204 "Sprinkling", or by applying an asphalt material at a rate of 0.05 to 0.20 gal. per square yard as directed. Maintain moisture content during curing. Upon completion of curing, maintain the moisture content in accordance with TxDOT's Item 132.3.5, "Maintenance of Moisture and Reworking" for treated subgrade prior to placing subsequent courses. Do not allow equipment on the finished layer during curing except as required for sprinkling, unless otherwise approved. Apply seals or additional layers or surface course within 14 calendar days of final compaction.

TABLE 2

MINIMUM CURING REQUIREMENTS BEFORE PLACING SUBSEQUENT LAYERS[1]

ORIGINAL (UNTREATED) SUBGRADE PI	CURING (DAYS)
PI ≤ 35	2
PI > 35	5

Subject to the approval of the Engineer. Proof rolling may be required as an indicator of adequate curing.

END OF SECTION 31 32 13.19

SECTION 31 32 13.20 HYDRATED LIME AND LIME SLURRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for establishing the requirements for hydrated lime and commercial lime slurry of the type and grade considered suitable for use in the treatment of natural or processed materials or mixtures for subgrade, sub-base and base construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. The various types and grades are defined and identified as follows:

1. Type A. Hydrated Lime: Shall consist of a dry powder obtained by treating quicklime with enough water to satisfy its chemical affinity for water under the conditions of its hydration. This material is to consist essentially of calcium hydroxide or a mixture of calcium hydroxide and a small allowable percentage of calcium oxide, magnesium oxide and magnesium hydroxide.

   When sampled and tested according to TxDOT's prescribed Tex600-J procedures, hydrated lime shall conform to the requirements of TxDOT's DMS-6350. Hydrated Lime for stabilization purposes shall be applied, as provided in the governing specifications, as a dry powder or mixed with water to form a slurry at the jobsite.

2. Type B. Commercial Lime Slurry: Shall be pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity or nature that would be injurious for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content", shall consist principally of hydrated lime of a quality and fineness sufficient to meet TxDOT's DMS-6350.

PART 3 - EXECUSION

3.1 SAMPLING AND TESTING

A. The sampling and testing of lime slurry shall be as determined by Test Procedure Tex-600-J, "Sampling and Testing Lime".

1. When Hydrated Lime is used, the quantity of lime will be measured by the ton of 2000 pounds, dry weight.
2. When Commercial Lime slurry is used, the quantity of lime shall be calculated from the required minimum percent solids based upon the use of Grade 1, Grade 2, or Grade 3 as follows:
   a. Grade 1: The "Dry Solids Content" shall be at least 31 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2,000 pounds based on the 31 percent dry weight solids.
   b. Grade 2: The "Dry Solids Content" shall be at least 35 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2,000 pounds based on the 35 percent dry weight solids.
   c. Grade 3: The "Dry Solids Content" shall be at least 46 percent by weight of the slurry and the quantity of lime will be calculated by the ton of 2,000 pounds based on the 46 percent dry weight solids.

3.2 MEASURES & PAYMENT

A. Hydrated Lime and Lime Slurry will be paid per lump sum as designated in the proposal and/or drawings, and shall be full compensation for furnishing all labor, materials, permits, supervision, equipment and supplies required to complete all items of work specified herein.

END OF SECTION 31 32 13.20

SECTION 31 32 13.21 LIME-FLYASH STABILIZED SUBGRADE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Mix and compact water, lime and fly ash (LFA), and subgrade in the roadway.

1.2 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Furnish uncontaminated material of uniform quality that meet the requirements of the plans and specifications. Notify the Engineer in writing of proposed material sources and of any proposed changes in material sources. The Contractor shall obtain verification from the Engineer that the specification requirements are met before using the sources. The Engineer may sample and test materials at any time before compaction.

1. Lime. Furnish lime that meets the requirements of TxDOT's DMS6350, "Lime and Lime Slurry," and DMS-6330, "Lime Sources Prequalification of Hydrated Lime and Quicklime." Use hydrated lime or commercial lime slurry as shown on the plans.
2. Fly Ash. Furnish fly ash that meets the requirements of DMS-4615, "Fly Ash for Soil Treatment."
3. Water. Furnish water free of industrial wastes and other objectionable matter.
4. Asphalt. When required by the Engineer for curing purposes, furnish asphalt or emulsion in accordance with TxDOT's Item 300, "Asphalts, oils, and Emulsions," as shown on the plans or as directed.
5. Mix Design. Using the material proposed for the project, the Engineer shall verify the target lime-fly ash content and optimum moisture content in accordance with ASTM D698 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3)" or based upon prior experience with the project materials. The Contractor may propose an alternative mix design developed in accordance with ASTM D698. The Engineer shall use ASTM D698 to verify the Contractor's proposed mix design before accepting it. The Contractor shall reimburse the County for all expenses incurred due to a change of mix designs or partial designs necessitated by changes in the design requested by the Contractor.

2.2 EQUIPMENT

A. Provide machinery, tools and equipment necessary for proper execution of the work.

B. Storage Facility. Store quicklime, dry hydrated lime, and fly ash in closed, weatherproof containers.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. Construct each layer uniformly, free of loose or segregated areas and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

1. Preparation of Subgrade for Treatment. Shape the subgrade in accordance with Item 205 "Subgrade", and applicable bid items to conform to typical sections shown on the

plans and as directed.

2. Pulverization. Pulverize or scarify existing subgrade after shaping so that 100% passes a 2-1/2" inch sieve. If the subgrade cannot be uniformly processed to the required depth in a single pass, excavate and windrow the material to expose a secondary grade to achieve processing to plan depth. Start treatment operations only when air temperature is at least 35°F and rising or is at least 40°F. The temperature shall be taken in the shade and away from artificial heat. Suspend operations when the Engineer determines that weather conditions are unsuitable.
3. Minimize dust and scattering by wind. Do not apply lime or fly ash when wind conditions, in the opinion of the Engineer, cause blowing lime or fly ash to become dangerous to traffic or objectionable to adjacent property owners.
4. During the interval between applications and mixing, sections treated with hydrated lime or fly ash that have been exposed to the open air for a period of 6 hours or more, or that experience excessive loss due to washing or blowing, shall not be accepted for payment.
5. After mixing and required curing, the Engineer shall sample the mixture at roadway moisture and test in accordance with Tex-101- E, Part III to determine compliance with the gradation requirements in the following table.

GRADATION REQUIREMENTS (MINIMUM % PASSING)

SIEVE SIZE	TREATED SUBGRADE
1-3/4 Inch	100
3/4 Inch	85
No. 4	60

6. Compaction. Compact immediately after mixing in the fly ash. Complete all compaction operations within 6 hours of fly ash application. Determine the moisture content of the mixture at the beginning and during compaction in accordance with ASTM D698. Compact to at least 95% of the maximum density as determined in accordance with ASTM D6938 "Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods" unless otherwise shown on the plans.
   a. Multiple lifts are permitted when shown on the plans or approved by the Engineer. Sprinkle the treated subgrade as directed or aerate to bring each layer to the moisture content directed.
7. Reworking a Section. Reworking includes loosening, adding material or removing unacceptable material if necessary, mixing as directed, compacting, and finishing. When removal is necessary, the Contractor shall replace failing material with other acceptable material from the project site or replace with Borrow as approved by the Engineer. Add lime and fly ash when reworking LFA-treated sections, at the rate of at least 25% of the percentage determined in Section "Mix Design" as directed. When repulverization of the failing section does not achieve the required density, remove failing material and replace with acceptable treated material.
   a. Determine a new maximum density of the reworked treated subgrade in accordance with ASTM D698.
8. Finishing. Immediately after completing compaction of the final layer, clip, skin, or tight-blade the surface to a depth of approximately 1/4 inch.
   a. Remove clipped material and dispose of it at an approved location. Seal the clipped surface immediately by rolling with a pneumatic tire roller until a smooth surface is attained. Add small increments of water as needed during

rolling. Shape and maintain the layer and surface in conformity with the typical sections, lines, and grades. Complete finishing operations within 2 hours after final compaction.

9. Curing. If the plans require a Prime Coat, place the Prime Coat as the curing method (pay item). Otherwise, cure by maintaining in a thorough and continuously moist condition by sprinkling as directed. When directed by the Engineer, cure with an asphalt emulsion applied at a rate of 0.05 to 0.20 gallons per square yard as approved (no pay item). Do not allow equipment on the finished course during curing except as required for sprinkling, unless otherwise approved.
   a. Cure the finished section for 7 days before adding another course or opening to traffic unless otherwise directed. Apply subsequent courses within 14 calendar days of completion of final compaction of the underlying treated course unless otherwise approved.

END OF SECTION 31 32 13.21

SECTION 31 41 00 TRENCH SAFETY SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for furnishing all labor and materials for installation and maintenance of a trench safety system.

B. For any trench excavation in materials other than solid rock, greater than 5 feet in depth, or where shown on the plans, the Contractor shall provide a trench safety system. This trench safety system shall be in accordance with the appropriate requirements established in the Occupational Safety and Health Administration (OSHA), Safety and Health Regulations, Part 1926, Subpart P - "Excavations" (Latest Edition).

1.2 MEASUREMENT

A. Measurement of the "Trench Safety System" for gravity pipelines and boxes and for pressure pipelines shall be made by the linear foot of trench measured along the centerline of the trench, for the depth indicated. The depths shall be indicated as follows:

1. From 5 to 10 feet
2. From 10 to 15 feet
3. From 15 to 20 feet
4. Greater than 20 feet

1.3 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 31 41 00

SECTION 32 05 19 IMPERMEABLE LINER

PART 1 - GENERAL

1.1 WORK

A. Furnishing all labor, materials and equipment needed to install the flexible polyethylene liner material as shown on the plans and as specified herein. All these materials need to be in accordance with all approved shop drawings.

1.2 REFERENCES

A. This specification refers to the following standards and specifications:
   1. ASTM D5641, D882, 1004, 4354, 5321, 6243, 6392.
   2. GR1 Test Method GM13
   3. GR1 Test Method GM19

1.3 SUBMITTALS

A. Manufacturer's standard warranty.

B. Liner data (meeting all criteria as specified in this specification).

1.4 QUALIFICATIONS

A. The manufacturer of the geomembrane sheet shall be approved by the Owner and have experience in extruding polyethylene materials.

B. The subcontractor/installer shall have at least five 5yrs experience in the installation of HDPE geomembrane and have performed at least 10 projects.

C. The installer shall be supervised by the superintendent who shall remain onsite throughout the process of the installation for subgrade acceptance, liner layout, sewing, testing and all other activities.

1.5 PROPERTIES

A. These values below are not design values but represent the minimum accepted physical characteristics of the geomembrane required.

Tear Resistant	18lbs
Thickness	30mil
Tensile Strength	125lbs
Tensile Elongation	680y
Grab Strength	170lbs
Puncture Consistence	40lbs

1.6 DELIVERY, STORAGE AND HANDLING

A. The rolls of liner shall be protected against deterioration from any deleterious conditions at all times.

1.7 WARRANTY

A. Installation - Installer shall provide the Owner with the following warranties along with a document commencing with the date of substantial completion:
   1. 1-year warranty for the installation
   2. 15-years warranty for the material

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 INSTALLATION

A. Liner shall be placed once all sub-base planarity has been approved by engineer.

B. Prior to installing the liner, no loose material (including but not limited to any sharp objects, rocks, debris) shall be acceptable.

C. No heavy equipment shall be allowed on top of the liner until 4" of material has been placed on top of the sub-base.

D. Seams: Per manufacturer's recommendation. Seaming shall not be allowed during rain.

E. Contractor shall take all precautions when unloading and placing rolls of lining to avoid damage. Verify the location of a sheet before unrolling and placement to avoid improper alignment.

3.02 INSPECTION AND ACCEPTANCE

A. Contractor shall examine the entire geomembrane surface to make sure is free of any defects or holes.

END OF SECTION 32 05 19

SECTION 32 11 23 PERMEABLE ROCK BASE AGGREGATE

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work includes furnishing all labor, material equipment and services to install the permeable aggregate base as shown on the submitted drawings.

1.2 REFERENCES

A. American Society for Testing and Materials, ASTM.

B. ASTM C29 – Test for unit weight and voids in aggregate.

1.3 RELATED SECTIONS

A. Section 32 1823 Infilled Synthetic Turf.

1.4 SUMITTALS

A. Permeable aggregate sieve analysis for fine course and base course.

B. Contractor shall supply 2 copies of all testing data and product materials data.

C. Contractor shall submit a sample warranty of all applicable materials and products.

1.5 QUALIFICATION

A. Synthetic turf base sub-contractor must have 6-year experience building synthetic turf bases.

B. Contractor shall provide proof of at least 8 sports fields base installations that have occurred in the past 8yrs.

C. Contractor to submit a list of all the subcontractor's projects in the past 5yrs.

D. Contractor must supply the following information for each listed project: Owner, contact information.

1.6 QUALITY ASSURANCE

A. Contractor to notify Engineer after completion of permeable rock base installation is complete. A laser needs to be set up by the turf contractor for Engineer to walk the finish grade and approve prior to commencing the installation of the infilled synthetic turf.

1.7 DELIVERY, STORAGE AND HANDING

A. Permeable rock base shall be delivered with proper moisture content and must be protected for any weather events that might washout the fines in the product.

1.8 WARRANTY

A. Contractor shall supply a 1-year warranty on all labor and workmanship of the permeable base.

PART 2 - PRODUCTS

2.01 BASE AND FINISH COURSE

A. Installation Rate = 40 in/hr.

B. ASTM C-131 and ASTM C-535 - L.A. Abrasion Test. The percentage lost by weight shall not exceed 40.

1. Base Course to meet the following criteria:

Sieve Size	% Passing by weight
1-1/2"	100
1"	95-100
¾"	80-90
½"	25-60
No. 4	0-10
No. 8	0-5

2. Finish course to meet the following criteria:

Sieve Size	% Passing by weight
No. 1/2	80-100
No. 3/8	40-70
No. 4	5-25
No. 8	0-10

PART 3 - EXECUTION

3.01 INSTALLATION

A. Contractor shall place and compact shall always maintain moisture content of 90% to 100% of optimum moisture. The specified base stone over the subgrade and perforated pipe to the elevations shown on the drawings. Finished surface shall be proof rolled with a vibratory smooth double drum roller to provide a smooth, flat surface. Compaction must be to 95% modified proctor. Nuclear method shall be used.

END OF SECTION 32 11 23

SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes but not limited to the following:

1. Driveways.
2. Roadways.
3. Parking lots.
4. Curbs and gutters.
5. Walks.

1.2 REFERENCES

A. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

B. ASTM C 33 - Standard Specifications for Concrete Aggregates.

C. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

E. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.

F. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

G. ASTM C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

H. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.

I. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.

J. ASTM C 150 - Standard Specification for Portland Cement.

K. ASTM C 174 - Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores.

L. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

M. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.

N. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

1.3 SUBMITTALS

A. Submit proposed mix design and test data for each type and strength of concrete in Work. Include proportions and actual flexural strength obtained from design mixes at required test ages.

PART 2 - PRODUCTS

2.1 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 Project Manager. 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 Project Manager.

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 values:

Item	% 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	.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)	% by Weight
Retained on 1 3/4" sieve	0
Retained on 1 1/2"sieve	0 to 5
Retained on 3/4" sieve	30 to 65
Retained on 3/8" sieve	70 to 90
Retained on No. 4 sieve	95 to 100
Loss by Decantation Test	
*Method 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)	% by Weight
Retained on 3/8" sieve	0
Retained on No. 4 sieve	0 to 5
Retained on No. 8 sieve	0 to 20
Retained on No. 16 sieve	15 to 50
Retained on No. 30 sieve	35 to 75
Retained on No. 50 sieve	65 to 90
Retained on No. 100 sieve	90 to 100
Retained on No. 200 sieve	97 to 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 25 percent by weight of cementatious 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 Project Manager.

H. Reinforcing Steel:
1. Provide new billet steel manufactured by open hearth process and 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.
2. Cold bend reinforcing steel to shapes shown. Once steel has been bent, it may not be rebent.
3. 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.

2.2 EQUIPMENT
A. Conform Equipment to requirements of ASTM C94.

2.3 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. Mix design to produce concrete which will have flexural strength of 500 psi at 7 days and 600 psi at 28 days. Minimum compressive strength shall be 3000 pounds per square inches for 7 days and 3500 pounds per square inches at 28 days when tested in accordance with ASTM C39. Slump of concrete shall be at least 2 inches but no more than 5 inches, when tested in accordance with ASTM C143.
   1. Concrete pavement, including curb, curb and gutter, and saw-tooth curb, shall contain at least 5 1/2 sacks (94 pounds per sack) of cement per cubic yard, with not more than 6.5 gallons of water, net, per sack of cement (water-cement ratio maximum 0.57). Determine cement content in accordance with ASTM C 138. Addition of mineral filler may be used to improve workability or plasticity of concrete to limits specified.
   2. Coarse dry aggregate shall not exceed 85 percent of loose volume of concrete.
   3. 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.
   4. 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. Use high early strength concrete pavement to limits shown on Drawings. Design to meet following:
   1. Concrete Mix: Flexural strength greater than or equal to 500 psi at 72 hours.
   2. Cement: Minimum of 7 sacks of cement per cubic yard of concrete.
   3. Water-Cement Ratio maximum of 0.45. Slump of concrete shall a maximum of 5 inches, when tested in accordance with ASTM C 143.
   4. Other requirements for proportioning, mixing, execution, testing, etc., shall be in accordance with this Section 02751 - Concrete Paving.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify compacted base is ready to support imposed loads and meets compaction requirements.

B. Verify lines and grades are correct.

3.2 PREPARATION

A. Properly prepare, shape and compact each section of subgrade before placing forms, reinforcing steel or concrete. After forms have been set to proper grade and alignment, use subgrade planer to shape subgrade to its final cross section. Check contour of subgrade with template.

B. Remove subgrade that will not support loaded form. Replace and compact subgrade to required density.

3.3 EQUIPMENT

A. Alternate equipment and methods, other than those required by this Section, may be used provided equal or better results will be obtained. Maintain equipment for preparing subgrade and for finishing and compacting concrete in good working order.

B. Subgrade Planer and Template:
   1. Use subgrade planer with adjustable cutting blades to trim subgrade to exact section shown on Drawings. Select planer mounted on visible rollers which ride on forms. Planer frame must have sufficient weight so that it will remain on form, and have strength and rigidity that, under tests made by changing support from wheels to center, planer will not develop deflection of more than 1/8 inch. Tractors used to pull planer shall not produce ruts or indentations in subgrade. When slip form method of paving is used, operate subgrade planer on prepared track grade or have it controlled by electronic sensor system operated from string line to establish horizontal alignment and elevation of subbase.
   2. Provide template for checking contour of subgrade. Template shall be long enough to rest upon side forms and have strength and rigidity that, when supported at center, maximum deflection shall not exceed 1/8 inch. Fit template with accurately adjustable rods projecting downward at 1-foot intervals. Adjust these rods to gauge cross sections of slab bottom when template is resting on side forms.

C. Machine Finisher: Provide power-driven, transverse finishing machine designed and operated to strike off and consolidate concrete. Machine shall have two screeds accurately adjusted to crown of pavement and with frame equipped to ride on forms. Use finishing machine with rubber tires when it operates on concrete pavement.

D. Hand Finishing:
   1. Provide mechanical strike and tamping template 2 feet longer than width of pavement to be finished. Shape template to pavement section.
   2. Provide two bridges to ride on forms and span pavement for finishing expansion and dummy joints. Provide floats and necessary edging and finishing tools.

E. Burlap Drag or transverse broom for Finishing Slab: Furnish four plies of 10-ounce burlap material fastened to bridge to form continuous strip of burlap full width of pavement. Maintain contact 3-foot width of burlap material with pavement surface. Keep burlap drags clean and free of encrusted mortar.

F. Vibrators: Furnish mechanically-operated, synchronized vibrators mounted on tamping bar which rides on forms and hand-manipulated mechanical vibrators. Furnish vibrators with frequency of vibration to provide maximum consolidation of concrete without segregation.

G. Traveling Form Paver: Approved traveling form paver may be used in lieu of construction methods employing forms, consolidating, finishing and floating equipment. Meet requirements of this specification for subgrade, pavement tolerances, pavement depth, alignments, consolidation, finishing and workmanship. When traveling form paver does not provide concrete paving that meets compaction, finish, and tolerance requirements of this Specification, immediately discontinue its use and use conventional methods.
   1. Equip traveling paver with longitudinal trans-angular finishing float adjustable to crown and grade. Use float long enough to extend across pavement to side forms or edge of slab.
   2. Ensure that continuous deposit of concrete can be made at paver to minimize starting and stopping. Use conventional means of paving locations inaccessible to traveling paver or having horizontal or vertical curvature that traveling paver cannot negotiate.
   3. Where Drawings require tie bars for adjacent paving, securely tie and support bars to prevent displacement. Tie bars may be installed with approved mechanical bar inserter mounted on traveling-form paver. Replace pavement in which tie bars assume final position other than that shown-on Drawings.

3.4 FORMS

A. Side Forms: Use metal forms of approved shape and section. Preferred depth of form is equal to required edge thickness of pavement. Forms with depths greater or less than required edge thickness of pavement will be permitted, provided difference between form depth and edge thickness when not greater than 1 inch, and further provided that forms of depth less than pavement edge are brought to required edge thickness by securely attaching wood or metal strips to bottom of form, or by grouting under form. Bottom flange of form shall be same size as thickness of pavement. Aluminum forms are not allowed. Forms shall be approved by Project Manager. Length of form sections shall be not less than 10 feet and each section shall provide for staking in position with not less than 3 pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of 200-foot radius or less. Forms shall have ample strength and shall be provided with adequate devices for secure setting so that when in-place they will withstand, without visible springing or settlement, impact and vibration of finishing machine. In no case shall base width be less than 8 inches for form 8 inches or more in height. Forms shall be free from warp, bends or kinks and shall be sufficiently true to provide straight edge on concrete. Top of each form section, when tested with straight edge, shall conform to requirements specified for surface of completed pavement. Provide sufficient forms for satisfactory placement of concrete. For short radius curves, forms less than 10 feet in length or curved forms may be used. For curb returns at street intersections and driveways, wood forms of good grade and quality may be used.

B. Form Setting:

1. Rest forms directly on subgrade. Do not shim with pebbles or dirt. Accurately set forms to required grade and alignment and, during entire operation of placing, compacting and finishing of concrete, do not deviate from this grade and alignment more than 1/8 inch in 10 feet of length. Do not remove forms for at least 8 hours after completion of finishing operations. Provide supply of forms that will be adequate for orderly and continuous placing of concrete. Set forms and check grade for at least 300 feet ahead of mixer or as approved by Project Manager.
2. Adjacent slabs may be used instead of forms, provided that concrete is well protected from possible damage by finishing equipment. Do not use adjacent slabs for forms until concrete has aged at least 7 days.

3.5 REINFORCING STEEL AND JOINT ASSEMBLIES

A. Place reinforcing steel and joint assemblies and position securely as indicated on Drawings. Wire reinforcing bars securely together at intersections and splices. Bars and coatings shall be free of rust, dirt or other foreign matter when concrete is placed. Secure reinforcing steel to chairs.

B. Position pavement joint assemblies at required locations and elevations, and rigidly secure in position. Install dowel bars in joint assemblies, each parallel to pavement surface and to center line of pavement, as shown.

C. Cut header boards, joint filler, and other material used for forming joints to receive each dowel bar.

D. Secure in required position to prevent displacement during placing and finishing of concrete.

E. Drill dowels into existing pavement, secure with epoxy, and provide paving headers as required to provide rigid pavement sections.

F. 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.

3.6 FIBROUS REINFORCING

A. Do not use fibrous reinforcing to replace structural, load-bearing, or moment-reinforcing steel.

3.7 PLACEMENT

A. Place concrete when air temperature taken in shade and away from artificial heat is above 35 degrees F and rising. Do not place concrete when temperature is below 40 degrees F and falling.

B. Place concrete within 90 minutes after initial water had been added. Remove and dispose of concrete not placed within this period.

C. Concrete slump during placement shall be 1 to 5 inches, except when using traveling-form paver, slump shall be maximum of 2 inches.

D. 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.

E. 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.

3.8 COMPACTION

A. Consolidate concrete using mechanical vibrators as specified herein. Extend vibratory unit across pavement, not quite touching side forms. Space individual vibrators at close enough intervals to vibrate and consolidate entire width of pavement uniformly. Mount mechanical vibrators to avoid contact with forms, reinforcement, transverse or longitudinal joints.

B. Furnish enough hand-manipulated mechanical vibrators for proper consolidation of concrete along forms, at joints and in areas not covered by mechanically controlled vibrators.

3.9 FINISHING

A. Finish concrete pavement with power-driven transverse finishing machines or by hand finishing methods.

1. Hand finish with mechanical strike and tamping template in same width as pavement to be finished. Shape template to pavement section shown on Drawings. Move strike template forward in direction of placement, maintaining slight excess of material in front of cutting edge. Make minimum of two trips over each area. Screed pavement surface to required section. Work screed with combined transverse and longitudinal motion in direction work is progressing. Maintain screed in contact with forms. Use longitudinal float to level surface.

B. On narrow strips and transitions, finish concrete pavement by hand. Thoroughly work concrete around reinforcement and embedded fixtures. Strike off concrete with strike-off screed. Move strike-off screed forward with combined transverse and longitudinal motion in direction work is progressing, maintaining screed in contact with forms, and maintaining slight excess of materials in front of cutting edge. Tamp concrete with tamping template. Use longitudinal float to level surface.

C. After completion of straightedge operation, make first pass of burlap drag or transverse broom as soon as construction operations permit and before water sheen has disappeared from surface. Follow with as many passes as required to produce desired texture depth. Permit no unnecessary delays between passes. Keep drag wet, clean and free from encrusted mortar during use.

3.10 TOLERANCES

A. Test entire surface before initial set and correct irregularities or undulations. Bring surface within requirements of following test and then finish. Place 10 foot straightedge parallel to center of roadway to bridge depressions and touch high spots. Do not permit ordinates measured from face of straight edge to surface of pavement to exceed 1/16 inch per foot from nearest point of contact. Maximum ordinate with 10 foot straightedge shall not exceed 1/8 inch. Grind spots in excess of required tolerances to meet surface test requirements. Restore texture by grooving concrete to meet surface finishing specifications.

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 Project Manager for high early strength concrete. Test remaining two specimens at 28 days. Test specimens in accordance with ASTM C 39. Minimum compressive strength shall be 3000 pounds per square inch for first two specimens and 3500 pounds per square inch at 28 days.

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 375 feet per 12 feet lane or 500 square yards 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 3000 pounds per square inch.

D. Request, at option, three additional cores in vicinity of cores indicating nonconforming inplace depths at no cost to City. 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 NONCONFORMING PAVEMENT

A. Remove and replace areas of pavement found deficient in thickness by more than 10 percent, or that fail compressive strength tests, with concrete of thickness shown on Drawings.

B. When measurement of any core is less than specified thickness by more than 10 percent, actual thickness of pavement in this area will be determined by taking additional cores at 10 foot intervals parallel to centerline in each direction from deficient core until, in each direction, core is taken which is not deficient by more than 10 percent. Exploratory cores for deficient thickness will not be used in averages for adjusted unit price. Exploratory cores are to be used only to determine length of pavement in unit that is to be removed and replaced. Replace nonconforming pavement sections at no additional cost to City.

3.13 PAVEMENT MARKINGS

A. Restore pavement markings to match those existing in accordance with City/County standard specifications and details and Project Manager's requirements.

3.14 PROTECTION

A. Barricade pavement section to prevent use until concrete has attained minimum design strength. Cure barricade pavement section for minimum 72 hours before use. Do not open pavement to traffic until concrete is at least 10 days old. Pavement may be open to traffic earlier provided Contractor pays for testing and additional specimen once 7 day specified strength is obtained. Pavement may be opened when high early strength concrete is used meeting specified 72 hour strength.

B. High early strength concrete may be used to provide access at driveways, street intersections, esplanades and other locations approved by Project Manager.

C. On those sections of pavement to be opened to traffic, seal joints, clean pavement, and place earth against pavement edges before permitting use by traffic. Opening of pavement to traffic shall not relieve responsibility for Work.

D. Maintain concrete paving in good condition until completion of Work.

E. Repair defects by replacing concrete to full depth.

END OF SECTION 32 13 13

SECTION 32 18 20 GLUE DOWN SYNTHETIC TURF (Alternate #6)

PART 1 - GENERAL

1.01 WORK

A. Furnishing all labor, materials and equipment needed to install the turf textured polypropylene material in all baseball and softball dugouts, as shown on the plans and as specified herein. All these materials need to be in accordance with all approved shop drawings.

1.02 REFERENCES

A. Meet all ASTM requirements.

1.03 SUBMITTALS

A. Submit a 9"x12" sample of the turf product to be used.

B. Substitution Submittals shall be in accordance with spec section 01 25 00 - Submittal Procedures.

C. Alternate products and deviations shall be in accordance with spec section 00 21 13.6 - Instructions for CSP Package B Base Bid Adjustment.

1.04 MAINTENANCE MANUALS

A. Maintenance manuals shall be provided by turf contractor prior to accepting the field.

1.05 WARRANTY

A. See Section 01 7700 Closeout Procedures.

B. The contractor shall provide an eight-year (8yr) warranty to the Owner covering defects in material and workmanship.

C. The manufacturer's warranty shall include wear and damage caused from UV degradation.

D. The warranty shall be fully third-party insured with an aggregate liability coverage of $1,000,000.

E. Contractor must provide a sample copy of insured, non-prorated warranty and insurance policy information.

F. Warranty shall become effective the day the substantial completion certificate has been signed by the Owner and Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Approved turf system manufacturers are as follows:
   1. AstroTurf - PGPN
   2. FieldTurf - FitTurf
   3. Hellas - Duraplay
   4. Shaw - Elevate 48
   5. SporTurf - SporTurf 36

2.02 MATERIALS AND EQUIPMENT

A. Contractor/installer must make sure the glue down turf meets the following characteristics:

Alternate #6 Glue Down SyntheticTurf *All characteristics listed below are nominal 3% +/-*		
Standard	Property	Characteristic
	Yarn Structure	Polypropylene
	Fabric Construction	Tufted
	Primary Backing	Dual Layered Woven Polypropylene
	Coating Type	5mm Polyurethane Foam/ SilverBack™ Polyurethane
	Perforations	No
	Recommended Infill	N/A
ASTM D5823	Pile Height	7/16" - 9/16 "
ASTM D5848	Pile Weight	118-125 oz
ASTM D5848	Face Weight	36-40 oz/sq.yd
ASTM D-2256	Grab Tear Strength	>200 lbs
ASTM D-2765	Lead Content	<50 ppm
ASTM D-1577	Total Yarn Linear Density	4,600-8,000 denier
ASTM D-5793	Stitch Rate	19 (per 3")
ASTM D-5793	Machine Gauge	3/16"

B. Contractor/installer must verify all measurements.

C. Synthetic Glue Material:

1. Contractor shall only use adhesive products that are suitable for the installation of turf systems per the adhesive manufacturer.

PART 3 - EXECUTION

3.01 GENERAL

A. The installation of the glue down synthetic turf shall be completed in full compliance with approved shop drawings.

3.02 CLEAN UP

B. Labor, supplies and equipment shall be provided by Contractor as needed for final cleaning of all installed items.

C. After turf installation is complete, all surfaces and site, shall be clean throughout the project.

3.03 SCHEDULE

A. Contractor/installer shall complete all required installation of the glue down synthetic turf in accordance with the published project schedule.

END OF SECTION 32 18 20

SECTION 32 18 23 INFILLED SYNTHETIC TURF

PART 1 - GENERAL

1.1 WORK

A. Furnishing all labor, materials and equipment needed to install the infilled synthetic turf material as shown on the plans and as specified herein. A complete installation includes the acceptance of sub-base and coordination with all trades to ensure a complete and timely installation. All materials must comply with approved shop drawings and Synthetic Turf Council (STC) Guidelines for Essential Elements of Synthetic Turf Systems.

1.2 REFERENCES

A. Meet all ASTM requirements, including but not limited to ASTM D5848, ASTM D5823, ASTM D1907, ASTM D1335, ASTM D5034, ASTM D4491, ASTM D5793, ASTM F1936.
B. Conform to NFHS baseball and softball field performance requirements.
C. Infill materials to comply with STC Suggested Environmental Guidelines for Infill (EN 71-3 migration of elements).
D. American Sports Builders Association (ASBA), Sports Fields: Construction & Maintenance Manual (2024 edition).

1.3 SUBMITTALS

A. Submit a 9"x12" sample of the turf product to be used.

B. Submit a list with a minimum of ten (10) fields using the turf product to be used in this project.

C. Substitution Submittals shall be in accordance with spec section 01 25 00 - Submittal Procedures.

D. Alternate products and deviations shall be in accordance with spec section 00 21 13.6 - Instructions for CSP Package B Base Bid Adjustment.

E. Provide Certificate of Compliance for infill per STC Environmental Guidelines showing testing to EN 71-3 heavy metals limits. Annual testing required.

1.4 SHOP DRAWINGS

A. Shop drawings shall be submitted to the Engineer for approval prior to manufacturing and shall contain information regarding the following:
   1. Field Layout:
      a. Field marking plan and details for the specified sport, roll, seaming layouts and attachment methods.
   2. Product Data:
      a. Submit material safety sheets preparation and installation instructions and recommendations.
      b. Submit fiber manufacturer's type and composition.
      c. Submit manufacturer's certification to ensure products and materials comply with specifications.
      d. Submit test results indicating compliance with ASTM standards.

1.5 INSTALLERS EXPERIENCE

A. The turf installer shall have done at least five (5) acceptable installation of a Baseball and Softball Fields in the US within the past five-years (5yrs). Installer shall provide a list of projects with Owner information including phone number.

B. Turf contractors shall have at least six-year (6yr) experience installing this type of turf material.

1.6 MAINTENANCE MANUALS

A. Maintenance manuals shall be provided by turf contractor prior to accepting the field. Manuals shall include STC 13 Steps to Infill Control recommendations for maintenance, containment, and cleaning.

1.7 WARRANTY

A. See Section 01 7700 Closeout Procedures.

B. The contractor shall provide an eight-year (8yr) warranty to the Owner covering defects in material and workmanship.

C. The manufacturer's warranty shall include wear and damage caused from UV degradation.

D. The warranty shall be fully third-party insured with an aggregate liability coverage of $1,000,000.

E. Contractor must provide a sample copy of insured, non-prorated warranty and insurance policy information.

F. Warranty shall become effective the day the substantial completion certificate has been signed by the Owner and Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

As the project Base Bid, the District requires a turf system utilizing a monofilament/slit-film blend.

Yarn Structure: Blend of monofilament fibers and slit-film fibers. Combines the durability and reduced infill splash of slit-film with the upright, natural look and playability of monofilament. This structure is preferred for heavy-use, multi-sport applications such as baseball and softball, where both aesthetics and resilience are critical.

1. AstroTurf – Rhino Blend
2. FieldTurf - DoublePlay
3. Hellas - Major Play Matrix Helix Blend
4. Shaw - Legion Pro
5. SportsTurf - NR34 Elite

B. Approved base builders for either selected system:

1. Fielder's Choice
2. Hellas
3. Paragon

Base Bid (Blend)		
Standard	Property	Characteristic
	Yarn Structure	Monofilament & Slit Film Blend
Outfield Characteristics		
ASTM D5848	Pile Weight	40 oz/sq.yd.
ASTM D5823	Pile Height	2 in
ASTM D	Total Weight	77 oz/sq.yd
ASTM D1907	Yarn Denier	17,600
ASTM D1335	Tuft Bind	>8 lbs
ASTM D5848	Primary Backing Weight	7 oz/sq.yd
ASTM D5848	Secondary Coating Weight	20 oz/sq.yd
ASTM D5034-D1682	Grab Tear Strength	>200 lbs
ASTM D4491	Permeability	>40 in/hr
	Fabric Width	15'
ASTM D5793	Tuft Gauge	3/8"
	Fiber	C8 Resin UV-Resistant
Infield Characteristics		
ASTM D5848	Pile Weight	40 oz/sq.yd.
ASTM D5823	Pile Height	1.5 in
ASTM D	Total Weight	73 oz/sq.yd
ASTM D1907	Yarn Denier	17,600
ASTM D1335	Tuft Bind	>8 lbs
ASTM D5848	Primary Backing Weight	7 oz/sq.yd
ASTM D5848	Secondary Coating Weight	20 oz/sq.yd
ASTM D5034-D1682	Grab Tear Strength	>200 lbs
ASTM D4491	Permeability	>40 in/hr
	Fabric Width	15'
ASTM D5793	Tuft Gauge	3/8"
	Fiber	C8 Resin UV-Resistant

** All characteristics listed above are nominal 3% +/-.*

2.02 MATERIALS AND EQUIPMENT

A. Equipment:

1. Synthetic Turf Groomer: Contractor shall furnish a sweeper/groomer 920 SDE or approved equivalent.
2. Contractor to include (5) additional synthetic turf base mount, home base and bases cutouts per field.

B. Contractor/installer must verify all measurements.

C. Synthetic Glue Material:

Contractor shall only use adhesive products that are suitable for the installation of turf systems per the adhesive manufacturer and resistant to water, fungus, and mildew (per STC).

D. Infill Material:

1. The synthetic infill material shall be a combination of graded sand and ambient rubber materials.
2. All infill must be certified per STC Suggested Environmental Guidelines for Infill (EN 71-3). Provide Certificate of Compliance from an ISO/IEC 17025 accredited lab.

3. Infill Control: Contractor shall implement STC 13 Steps to Infill Control including splash reduction, containment barriers, cleaning stations, drainage filters, equipment cleaning, and snow removal protocols.

Rubber-SBR (Styrene butadiene rubber) Free of any steel material	
Mesh Size	% Retained
No. 10	0-15
No. 12	15-30
No. 16	40-70
No. 30	0-10
No. 40	0-1

Sand (Roundness .06+, Density 90-95lbs/CF, Angle of Response <30d)	
Mesh Size	% Retained
No. 8	0-15
No. 16	15-30
No. 20	40-70
No. 30	0-10
No. 50	0-1
No. 100	99-100
No. 200	100

** Total minimum weight = 3lb/sf of rubber infill material*

2.03 GMAX INFORMATION

A. Gmax turf installer shall provide all data showing that the required Gmax shock attenuation has been met. Testing shall be performed in accordance with ASTM F1936.

B. In accordance with ASBA, NFHS, guidance, Gmax values shall measure ~100–120 at installation and shall not exceed 165 over the life of the field.

C. If at any point during the 8-year warranty period the field is Gmax tested and does not meet the specified requirements, the turf contractor and/or manufacturer shall reimburse the Owner for the test cost and shall make the necessary improvements to the field to bring it into compliance.

PART 3 - EXECUTION

3.01 FIELD MARKINGS

A. Field Markings shall be installed in accordance with approved project shop drawings. Lines and logos shall be inlaid per STC best practices. Painted markings shall use turf-compatible paint.

3.02 GENERAL

A. The installation of the synthetic turf system shall be completed in full compliance with approved shop drawings.

B. The turf project supervisor must be present during all construction activity, including testing.

C. Only trained technicians under direct supervision of the turf project supervisor shall perform any sewing, gluing or cutting operations.

D. Extreme care shall be taken to avoid disturbing the sub-base when installing the synthetic turf rolls.

E. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. Infill material shall be placed to a depth determined by the manufacturer.

3.03 SITE INSPECTION

A. Prior to commencing the installation, the contractor/installer of the synthetic turf shall inspect the sub-base for the purpose of determining the acceptability of the surface.

B. The acceptance of the sub-base includes a very detailed planarity check. Contractor/installer shall use a laser level as a tool for the planarity check and shall correct any deviations to the satisfaction of the Engineer.

3.04 PREPARATION

A. Prior to installation, contractor/installer must inspect the sub-base for tolerance to grade.

B. Sub-base shall also be inspected and accepted by the Engineer.

C. The Engineer shall not approve the sub-base until a survey has been provided meeting all requirements.

3.05 CLEAN UP

A. Labor, supplies and equipment shall be provided by Contractor as needed for final cleaning of all installed items.

B. After turf installation is complete, all surfaces and site, including track surfaces, shall be clean throughout the project.

3.06 SCHEDULE

A. Contractor/installer shall complete all required installation of the synthetic turf in accordance with the published project schedule.

END OF SECTION 32 18 23

SECTION 32 18 23.1 INFILLED SYNTHETIC TURF (ALTERNATE #4)

PART 1 - GENERAL

1.1 WORK

A. Furnishing all labor, materials and equipment needed to install the infilled synthetic turf material as shown on the plans and as specified herein. A complete installation includes the acceptance of sub-base and coordination with all trades to ensure a complete and timely installation. All materials must comply with approved shop drawings and Synthetic Turf Council (STC) Guidelines for Essential Elements of Synthetic Turf Systems.

1.2 REFERENCES

A. Meet all ASTM requirements, including but not limited to ASTM D5848, ASTM D5823, ASTM D1907, ASTM D1335, ASTM D5034, ASTM D4491, ASTM D5793, ASTM F1936.
B. Conform to NFHS baseball and softball field performance requirements.
C. Infill materials to comply with STC Suggested Environmental Guidelines for Infill (EN 71-3 migration of elements).
D. American Sports Builders Association (ASBA), Sports Fields: Construction & Maintenance Manual (2024 edition).

1.3 SUBMITTALS

A. Submit a 9"x12" sample of the turf product to be used.

B. Submit a list with a minimum of ten (10) fields using the turf product to be used in this project.

C. Substitution Submittals shall be in accordance with spec section 01 25 00 - Submittal Procedures.

D. Alternate products and deviations shall be in accordance with spec section 00 21 13.6 - Instructions for CSP Package B Base Bid Adjustment.

E. Provide Certificate of Compliance for infill per STC Environmental Guidelines showing testing to EN 71-3 heavy metals limits. Annual testing required.

1.4 SHOP DRAWINGS

A. Shop drawings shall be submitted to the Engineer for approval prior to manufacturing and shall contain information regarding the following:
   1. Field Layout:
      a. Field marking plan and details for the specified sport, roll, seaming layouts and attachment methods.
   2. Product Data:
      a. Submit material safety sheets preparation and installation instructions and recommendations.
      b. Submit fiber manufacturer's type and composition.
      c. Submit manufacturer's certification to ensure products and materials comply with specifications.
      d. Submit test results indicating compliance with ASTM standards.

1.5 INSTALLERS EXPERIENCE

A. The turf installer shall have done at least five (5) acceptable installation of a Baseball and Softball Fields in the US within the past five-years (5yrs). Installer shall provide a list of projects with Owner information including phone number.

B. Turf contractors shall have at least six-year (6yr) experience installing this type of turf material.

1.6 MAINTENANCE MANUALS

A. Maintenance manuals shall be provided by turf contractor prior to accepting the field. Manuals shall include STC 13 Steps to Infill Control recommendations for maintenance, containment, and cleaning.

1.7 WARRANTY

A. See Section 01 7700 Closeout Procedures.

B. The contractor shall provide an eight-year (8yr) warranty to the Owner covering defects in material and workmanship.

C. The manufacturer's warranty shall include wear and damage caused from UV degradation.

D. The warranty shall be fully third-party insured with an aggregate liability coverage of $1,000,000.

E. Contractor must provide a sample copy of insured, non-prorated warranty and insurance policy information.

F. Warranty shall become effective the day the substantial completion certificate has been signed by the Owner and Engineer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. As Alternate #4, the District prefers the turf monofilament system to be described as follows: Yarn Structure: Monofilament: Fibers are individual and upright, designed to mimic natural grass blades.
1. AstroTurf RootZone Diamond
2. FieldTurf - XM360-50
3. Hellas - Major Play Matrix Helix
4. Shaw - PB Pro
5. SportsTurf - NR34

B. Approved base builders for either selected system:
1. Fielder's Choice
2. Hellas
3. Paragon

Alternate #4 Turf (Mono)		
Standard	Property	Characteristic
	Yarn Structure	Monofilament Only
Outfield Characteristics		
ASTM D5848	Pile Weight	30 oz/sq.yd.
ASTM D5823	Pile Height	2 in
ASTM D	Total Weight	77 oz/sq.yd
ASTM D1907	Yarn Denier	17,600
ASTM D1335	Tuft Bind	>8 lbs
ASTM D5848	Primary Backing Weight	7 oz/sq.yd
ASTM D5848	Secondary Coating Weight	20 oz/sq.yd
ASTM D5034-D1682	Grab Tear Strength	>200 lbs
ASTM D4491	Permeability	>40 in/hr
	Fabric Width	15'
ASTM D5793	Tuft Gauge	3/8"
	Fiber	C8 Resin UV-Resistant
Infield Characteristics		
ASTM D5848	Pile Weight	30 oz/sq.yd.
ASTM D5823	Pile Height	2 in
ASTM D	Total Weight	73 oz/sq.yd
ASTM D1907	Yarn Denier	17,600
ASTM D1335	Tuft Bind	>8 lbs
ASTM D5848	Primary Backing Weight	7 oz/sq.yd
ASTM D5848	Secondary Coating Weight	20 oz/sq.yd
ASTM D5034-D1682	Grab Tear Strength	>200 lbs
ASTM D4491	Permeability	>40 in/hr
	Fabric Width	15'
ASTM D5793	Tuft Gauge	3/8"
	Fiber	C8 Resin UV-Resistant

** All characteristics listed above are nominal 3% +/-.*

2.02 MATERIALS AND EQUIPMENT

A. Equipment:

1. Synthetic Turf Groomer: Contractor shall furnish a sweeper/groomer 920 SDE or approved equivalent.
2. Contractor to include (5) additional synthetic turf base mount, home base and bases cutouts per field.

B. Contractor/installer must verify all measurements.

C. Synthetic Glue Material:

Contractor shall only use adhesive products that are suitable for the installation of turf systems per the adhesive manufacturer and resistant to water, fungus, and mildew (per STC).

D. Infill Material:

1. The synthetic infill material shall be a combination of graded sand and ambient rubber materials.
2. All infill must be certified per STC Suggested Environmental Guidelines for Infill (EN 71-3). Provide Certificate of Compliance from an ISO/IEC 17025 accredited lab.

3. Infill Control: Contractor shall implement STC 13 Steps to Infill Control including splash reduction, containment barriers, cleaning stations, drainage filters, equipment cleaning, and snow removal protocols.

Rubber-SBR (Styrene butadiene rubber) Free of any steel material	
Mesh Size	% Retained
No. 10	0-15
No. 12	15-30
No. 16	40-70
No. 30	0-10
No. 40	0-1

Sand (Roundness .06+, Density 90-95lbs/CF, Angle of Response <30d)	
Mesh Size	% Retained
No. 8	0-15
No. 16	15-30
No. 20	40-70
No. 30	0-10
No. 50	0-1
No. 100	99-100
No. 200	100

** Total minimum weight = 3lb/sf of rubber infill material*

2.03 GMAX INFORMATION

A. Gmax turf installer shall provide all data showing that the required Gmax shock attenuation has been met. Testing shall be performed in accordance with ASTM F1936.

B. In accordance with ASBA, NFHS, guidance, Gmax values shall measure ~100–120 at installation and shall not exceed 165 over the life of the field.

C. If at any point during the 8-year warranty period the field is Gmax tested and does not meet the specified requirements, the turf contractor and/or manufacturer shall reimburse the Owner for the test cost and shall make the necessary improvements to the field to bring it into compliance.

PART 3 - EXECUTION

3.01 FIELD MARKINGS

A. Field Markings shall be installed in accordance with approved project shop drawings. Lines and logos shall be inlaid per STC best practices. Painted markings shall use turf-compatible paint.

3.02 GENERAL

A. The installation of the synthetic turf system shall be completed in full compliance with approved shop drawings.

B. The turf project supervisor must be present during all construction activity, including testing.

C. Only trained technicians under direct supervision of the turf project supervisor shall perform any sewing, gluing or cutting operations.

D. Extreme care shall be taken to avoid disturbing the sub-base when installing the synthetic turf rolls.

E. Infill materials shall be applied in numerous thin lifts. The turf shall be brushed as the mixture is applied. Infill material shall be placed to a depth determined by the manufacturer.

3.03 SITE INSPECTION

A. Prior to commencing the installation, the contractor/installer of the synthetic turf shall inspect the sub-base for the purpose of determining the acceptability of the surface.

B. The acceptance of the sub-base includes a very detailed planarity check. Contractor/installer shall use a laser level as a tool for the planarity check and shall correct any deviations to the satisfaction of the Engineer.

3.04 PREPARATION

A. Prior to installation, contractor/installer must inspect the sub-base for tolerance to grade.

B. Sub-base shall also be inspected and accepted by the Engineer.

C. The Engineer shall not approve the sub-base until a survey has been provided meeting all requirements.

3.05 CLEAN UP

A. Labor, supplies and equipment shall be provided by Contractor as needed for final cleaning of all installed items.

B. After turf installation is complete, all surfaces and site, including track surfaces, shall be clean throughout the project.

3.06 SCHEDULE

A. Contractor/installer shall complete all required installation of the synthetic turf in accordance with the published project schedule.

END OF SECTION 32 18 23.1

SECTION 32 31 15 CHAIN LINK FENCING AND GATES (COATED)

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. PVC-coated chain link fencing, gates, and accessories.

1.02 SUBMITTALS

A. Shop Drawings: Indicate materials, dimensions, details, and finish, show locations and installation procedures. Include details of fence and gate joints, attachments, accessories, footings, and clearances.

B. Product Data: Submit manufacturer's schedules, charts, literature, and illustrations indicating the performance, fabrication procedures, product variations and accessories indicating material compliance and specified options.

C. Samples: Submit color selection of PVC finishes for Architect's selection. If requested, submit samples of materials (i.e., fabric, wires, and accessories).

1.03 QUALITY ASSURANCE

A. Chain link fabric shall have the PVC thermally fused to the galvanized steel core wire. Extruded or bonded and glued chain link fence fabric will not be accepted.

B. Fence framework shall have the PVC thermally fused in compliance with ASTM F1234.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers must have a minimum of five (5) years experience manufacturing chain link fencing and gates meeting or exceeding the following specifications for design, size, gauge, finish of metal parts and fabrication and comply with Division 1 requirements for substitutions in order to be considered.

2.02 CHAIN LINK FENCE MATERIALS

A. Fence Fabric: Height of fence shall be 6’-0” and 8’-0” tall. Refer to drawings for locations.

1. PVC coating thermally fused to zinc-coated or zinc-5 percent aluminum-mischmetal alloy-coated steel core wire: ASTM F668 Class 2b, 7 mil thickness thermally fused. Core wire tensile strength 75,000 psi.

2. Size: Helically wound and woven to height of six (6) feet with two (2) inch diamond mesh, with core wire diameter of 0.148 inch (9 gauge) and a break load of 1290 IV.

3. Color: ASTM F934, Black.

4. Selvage of fabric shall be knuckled at top and knuckled at bottom.

B. Fence Framing:

1. Steel pipe - Type 1: ASTM F1083, standard weight schedule 40; minimum yield strength of 25,000 psi; sizes as indicated below. Hot-dipped galvanized with minimum average 1.8 oz/ft^2 of coated surface area.

a. Line posts: 1.90 inch o.d. up to 6 feet on center; 2.375 inch o.d. up to 10 feet on center.
b. Terminal, End, Corner, and Pull posts: 2.375 inch o.d. up to 6 feet on center; 2.975 inch o.d. up to 10 feet on center
c. Rails and Braces: 1.660 inch o.d.

2. PVC finish: In accordance with ASTM F1043, apply supplemental color coating of 10 to 15 mils thermally fused PVC in color to match fabric.

C. Fence Accessories:

1. Chain link fence accessories: Provide items required to complete fence system. Galvanize each ferrous metal item and finish to match framing.

2. Post caps: Formed steel, cast malleable iron, or aluminum alloy weather tight closure cap for tubular posts. Provide one cap for each post. (Where top rail is used, provide tops to permit passage of top rail.)

3. Top rail and brace rail ends: Formed steel, malleable or cast iron, for connection of rail and brace to terminal posts.

4. Top rail sleeves: 6 inch sleeve allowing for expansion and contraction of top rail.

5. Wire ties: 9 gauge galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge for rails and braces. Hog ring ties of 121/2 gauge for attachment of fabric to tension wire.

6. Brace and tension (stretcher bar) bands: Pressed steel.

7. Tension (stretcher) bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16 inch x 3/4 inch or equivalent fiber glass rod. Provide tension (stretcher) bars where chain link fabric meets terminal posts.

8. Tension wire: Thermally fused vinyl applied to metallic coated steel wire, 7 gauge, diameter core wire with tensile strength of 75,000 psi.

9. Truss rods: Steel rods with minimum diameter of 5/16 inch.

10. Nuts and bolts are galvanized but not vinyl coated. Color coat nuts and bolts with PVC touch up paint, provided by manufacturer, to match adjacent finishes.

2.03 CHAIN LINK SWING GATES

A. Gate frames: Fabricate chain link swing gates in accordance with ASTM F900 using galvanized steel tubular members, 2 inches square, weighing 2.60 lb/ft. Fusion or stainless steel welded connections forming rigid one-piece unit. Vinyl coated frames thermally fused with 10 to 15 mils of PVC in accordance with ASTM 1043. PVC color to match fence.

B. Chain link fence fabric: PVC thermally fused to metallic coated steel wire, ASTM F668, Class 2b, in color, mesh, and gauge to match fence. Install fabric with hook bolts and tension bars at all four (4) sides. Attach to gate frame at not more than 15 inches on center.

C. Hardware materials: Hot dipped galvanized steel or malleable iron shapes to suit gate size. Field coat moveable parts (i.e. hinges, latch, keeper, and drop bar) with PVC touch up paint, provided by manufacturer, to match adjacent finishes.

D. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees inward.

E. Latch: Forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.

F. Keeper: Provide keeper for each gate leaf over five (5) feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

G. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one (1) padlock for locking both gate leaves.

H. Gate posts: Steel pipe, ASTM F1083, standard weight schedule 40; minimum yield strength of 25,000 psi, 2.875 inches in diameter. Hot-dipped galvanized with minimum 1.8 oz/ft2 of zinc or respective material finished in accordance with ASTM F 1043. PVC color to match fence.

I. Refer to site plan for location and size.

2.04 CONCRETE

A. Concrete for post footings shall have a 28-day compressive strength of 2,500 psi. (17.2 MPa).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify areas to receive fencing are completed to final grades and elevations. Ensure property lines and legal boundaries of work are clearly established.

3.02 CHAIN LINK FENCE FRAMING INSTALLATION

A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.

B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.

C. Space line posts uniformly at 10 feet on center.

D. Concrete fence post footings:

1. Drill holes in firm, undisturbed or compacted soil. Excavate deeper than specified below as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.

2. Line posts shall be set in 9 inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3 inch concrete cover at bottom.

3. All end, corner, and pull posts shall be set in minimum 12 inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3 inch concrete cover at bottom.

4. Place concrete around posts in a continuous pour.

5. Trowel finish around post. Slope to direct water away from posts.

E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

F. Bracing: Install horizontal pipe brace at mid-height for fences six (6) and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.

G. Tension wire: Provide tension wire at bottom of fabric. Install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12-1/2 gauge hog rings 24 inches on center.

H. Top rail: Install lengths, 21 feet. Connect joints with sleeves for rigid connections for expansion/contraction.

I. Bottom Rails: Install bottom rails between posts with fittings and accessories.

3.03 CHAIN LINK FABRIC INSTALLATION

A. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2 inches between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15 inches on center and to rails, braces, and tension wire at 24 inches on center.

B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15 inches on center.

C. Install fencing in accordance with CLFMI recommendations and as follows:

1. Stretch fabric to proper tension between terminal posts and securely fasten to frame. Bottom of fabric shall be held as uniformly as practical to the finished grade.

2. Fasten chain link fabric to fences and backstops securely to terminal posts with 3/16 inch x 3/4 inch tension bars and 11 gauge tie wires, spacing not to exceed 14 inches apart. Tie fabric to top rail with 9 gauge tie wires, spacing not to exceed 24 inches.

3. Fasten chain link fabric to inside of fences of Baseball Fields.

4. Stretch bottom tension wire taut between terminal posts. Securely anchor to each intermediate post 6 inches above grade and secure to fence fabric with hog rings at 24 inches on center.

5. Cap top of all fence posts.

3.04 ACCESSORIES

A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.

B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.05 CHAIN LINK SWING GATE POST INSTALLATION

A. Install gate posts in accordance with manufacturer's instructions.

B. Concrete gate post footings:

1. Drill holes in firm, undisturbed or compacted soil. Excavate deeper than specified below as required for adequate support in soft and loose soils, and for posts with heavy lateral loads.

2. All gate posts shall be set in minimum 12 inch minimum diameter concrete piers, with a minimum of 33 inches of post embedment in concrete with an additional 3 inch concrete cover at bottom.

3. Place concrete around posts in a continuous pour.

4. Trowel finish around post. Slope to direct water away from posts.

C. Gate posts and hardware: Set keeper, stops, sleeves into concrete. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.

3.06 GATE INSTALLATION

A. Install gates plumb, level, and secure for full opening without interference.

B. Attach hardware by means which will prevent unauthorized removal.

C. Adjust hardware for smooth operation.

D. Touch up hardware with PVC touch up paint, provided by manufacturer, to match adjacent finishes.

3.07 CLEANING

A. Clean up debris and unused material, and remove from the site.

END OF SECTION 32 31 15

SECTION 32 91 19.13 TOPSOIL

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern furnishing and placing topsoil to the lines, grades and depth shown on the drawings or as directed by the Engineer. Topsoil is defined as the surface layer of material containing decaying vegetable matter and roots. It is not necessary to strip the section of topsoil containing fine, hairline roots, only soil containing moderate to severe root mat.

1.2 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - MATERIALS

2.1 TOPSOIL

A. Provide topsoil which is capable of sustaining native plant growth, easily cultivated, highly resistant to erosion, free from objectionable material including gravel, large roots, stumps, wood, brush, debris, hard clods, clay balls, hardpan, refuse or other deleterious materials, and of reasonably uniform quality.

B. If topsoil is required for the project, it shall be provided from an onsite source, or imported as directed by the Engineer.

C. Topsoil Delivery, Storage and Handling. Deliver, stockpile and handle topsoil in such a way as to not contaminate the material with other soils or objectionable materials. The stockpile or disposal site shall not be located within an environmentally sensitive area, floodway or wetland.

PART 3 - EXECUTION

3.1 INSTALLATION

A. The Contractor shall place the topsoil to the lines and grades and to the depths shown on the drawings.

B. Prior to placing topsoil, scarify or plow the subgrade to a minimum depth of 4 inches until it is loose and uncompacted to provide bonding of topsoil layer to subgrade. Remove vegetation and foreign inorganic material. Place topsoil on loosened material and roll lightly with appropriate lawn roller to consolidate topsoil.

3.2 CLEAN UP

A. Remove spilled topsoil from curbs, gutters, and paved areas and dispose of excess topsoil offsite.

3.3 PROTECTION

A. Topsoil shall be protected from wind and water erosion until planting is completed.

END OF SECTION 32 91 19.13

SECTION 32 92 13 HYDROMULCH SEEDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to the Drawings, Schedules and Details for type and locations of work required herein. Furnish all labor, materials, equipment and supervision for the installation of items included within these specifications. Such work includes, but is not limited to the following:

1. Furnishing and applying hydromulch seeding. This item includes all materials and equipment required for installation.
2. Site cleanup and maintenance.

1.2 QUALITY ASSURANCE

A. Contractor to perform work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by all local authorities in furnishing and installing materials.

1.3 SCHEDULE

A. Contractor to submit a proposed work schedule to the Engineer for approval prior to start of commencing work.

1.4 DELIVERY, STORAGE AND HANDLING

A. Furnish standard products in manufacturer's standard containers bearing original labels showing quantity, analysis and name of manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Seed:

1. A. All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of Invitation for Bids. All seed shall be furnished in sealed standard containers unless exception is granted in writing by the Engineer. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. The minimum percentage by weight or pure live seed in each lot of seed shall be as follows and seed shall be planted at the rate per acre indicated under pure live seed required per acre.

Kind of Seed	Min. % Pure Live Seed Required	Pounds Pure Live Seed Required Per Acre
Bermuda Grass	85	7
K.R. Bluestem	85	1
Bahiagrass (Pensacola)	85	9

Note: % Pure Live Seed = (% Purity) X (% Germination)

2. Weed seed shall not exceed ten (10%) of weight of the total of pure live seed and other material in the mixture. Johnson grass, nut grass, or other noxious weed seed will not be allowed.
3. Source - Quality Control.
   a. Seed: The Contractor must follow the Federal Seed Act with respect to interstate commerce and transportation. Each lot of seed may be re- sampled and retested in accordance with latest Rules and Regulations under the

Federal Seed Act at the discretion of the Owner. The seed retests will be conducted by a testing laboratory allowed by the State of Texas Department of Agriculture Seed Control Office. Material found to be below specified content levels will be at the contractor's responsibility to correct by removing and replanting and/or additional plantings.

PART 3 - EXECUTION

3.1 GENERAL

A. Once the finish grade has been approved by the Engineer, begin hydroseeding operation to reduce excessive weed growth.

B. Contractor shall commence hydroseeding process.

C. Contractor to make sure the hydromulch equipment contains a built-in agitation system.

3.2 SPECIAL MULCHING EQUIPMENT AND PROCEDURES

A. Hydraulic equipment used for the application of fertilizer, seed, and slurry of prepared wood fiber mulch shall have a built-in agitation system with an operating capacity sufficient of agitate, suspend, and homogeneously mix a slurry containing up to forty (40) pounds of fiber plus a combined total of seventy (70) pounds of fertilizer solids for each one hundred (100) gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which provide even distribution of the slurry on the slopes to be seeded. The slurry tank shall have a minimum capacity of eight hundred (800) gallons and shall be mounted on a traveling unit which may be either self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded so as to provide uniform distribution without waste. The Engineer may authorize equipment with smaller tank capacity provided that the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

3.3 MIXING

A. Care shall be taken that the slurry preparation should be accomplished per the material supplier's recommendations and the equipment manufacturer's written operations manual. Spraying shall commence immediately when the slurry is mixed and the tank is full. The operator shall spray the area with a uniform, visible coat by using the green color of the wood pulp as a guide.

3.4 APPLICATION

A. Contractor shall coordinate with Engineer to make sure the hydromulch area has been established prior to application.

B. Operators of hydromulching equipment shall be experienced in this type of application.

C. All areas designed on drawings shall be covered uniformly with specified materials using hydromulching processes. If surfaces remain uncovered within the designated area, the Contractor shall seed with required grasses or ground cover materials those areas missed by the hydromulch application. Method used to seed these missed surfaces shall be an alternate seeding operation approved by the Architect/Engineer/Owner's Representative and shall be accomplished at no additional cost to the Owner.

3.5 CLEAN UP

A. Once the application of hydromulch has been completed, contractor must wash off any paved areas or plants not intended to receive the mix.

B. Prior to final acceptance of Engineer, contractor shall have all surroundings free of debris and all deleterious materials removed.

3.6 MAINTENANCE BY THE CONTRACTOR

A. The Contractor shall begin maintenance after each plant is installed and continue until Final Acceptance.

B. The Contractor's Maintenance Period shall begin upon inspection and approval at Substantial Completion and shall be for the period of 60 days.

C. The Contractor's maintenance of new planting shall consist of watering, weeding, repair of all erosion and reseeding and resodding as necessary to establish a uniform stand of the specified grasses. Contractor shall guarantee growth and coverage of hydromulch planting under this Contract to the effect that a minimum of ninety-five (95%) percent of the area planted will be covered with specified planting after sixty (60) days with no bare spots greater than ten (10) square feet. Any sod panels that are dead or dying shall be replaced.

D. Contractor shall make a second application of specified hydromulch planting to bare areas not meeting specified coverage as determined by the Engineer. Such replanting to be performed within sixty (60) days of initial application and immediately upon notification by Engineer to replant.

E. Apply top dress fertilizer (16-6-8) at the rate of ten (10) pounds per 1,000 square feet at no less than nor more than twenty-five (25) days after seeding unless approved in writing by the Owner.

3.7 FINAL ACCEPTANCE

A. Work under this Section will be accepted by Engineer upon satisfactory completion of all work, but exclusive of re-application under the Guarantee Period.

B. For Seed: ninety-five (95%) percent uniform coverage of grass in excess of one (1") inch height. No bare spots of greater than two (2) square feet will be accepted.

C. The Engineer and/or Owner shall interpret the above. Upon Final Acceptance, the Owner will assume the responsibility for maintenance of the work.

END OF SECTION 32 92 13

SECTION 32 92 23 FERTILIZER

PART 1 - GENERAL

1.1 DESCRIPTION

A. This Item shall govern for providing and distributing fertilizer over such areas as are designated for sodding for erosion control and stabilization, hydro-mulch seeding, or seeding and erosion control blanket and in accordance with these Standard Specifications.

1.2 MEASUREMENT

A. Acceptable material for "Fertilizer" will be measured by pounds of guaranteed weight of sacks shown by manufacturer.

1.3 PAYMENT

A. No separate payment shall be made for materials furnished or work performed under this Section. Include the cost of same in the contract price bid for work of which this is a component part.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All fertilizer used shall be delivered in bags or containers clearly labeled showing analysis. A pelleted or granulated fertilizer shall be used with an analysis of 10-10-5 (nitrogen – phosphoric acid – potash), unless otherwise approved by the Engineer. The figures in the analysis represent the nitrogen, phosphoric acid and potash nutrients respectively as determined by the methods of the Association of Official Agricultural Chemists. The sources of nitrogen in the fertilizer shall be roughly balanced between ammonical (quick release) and nitrate nitrogen (slow release).

B. Fertilizer shall be readily water-soluble. Fertilizer of a different analysis may be substituted as approved by the Engineer. It shall be pelleted or granulated fertilizer with a lower concentration. The total amounts of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

PART 3 - EXECUTION

3.1 CONSTRUCTION METHODS

A. When fertilizer is included in the specifications, pelleted or granulated fertilizer shall be applied uniformly over the area specified to be fertilized and in the manner directed for the particular item of work. Fertilizer shall be dry and in good physical condition. Fertilizer that is powdered or caked will be rejected. Distribution of fertilizer for the particular item of work shall meet the approval of the Engineer.

B. Unless otherwise indicated on the plans, fertilizer shall be applied uniformly at the average rate of 480 pounds per acre when "Sodding for Erosion Control", and 400 pounds per acre when "Seeding for Erosion Control".

END OF SECTION 32 92 23

SECTION 32 93 00 SOLID SODDING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnishing all labor, materials and equipment needed for the solid sodding, as shown on the plans and as specified herein. All materials need to be in accordance with all approved shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Turfgrass sod shall be machine cut at a uniform soil thickness of 0.5 inch (13 mm), plus or minus 0.2 inch (5 mm), at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

2.2 FERTILIZERS

A. Fertilizer: Granular, pelleted,or liquid/flowable fertilizer:

1. Composition: 20 percent nitrogen, 20 percent phosphorous,10 percent potassium, and 3 percent iron, by weight.

2.3 PESTICIDES

A. General: Pesticide, approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
3. Uniformly moisten excessively dry soil that is not workable or which is dusty. B. Proceed with installation only after unsatisfactory conditions have been corrected. C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the Engineer and replace with new planting soil.

3.2 SODDING

A. Do not lay sod if dormant or if ground is frozen or muddy.

3.3 TURF MAINTENANCE

A. General: Maintain turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and

replant eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Replace turf damaged.
2. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering:
1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a recommended ET rate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
1. Mow bermudagrass to a height of 1.5 inches (38 mm).

D. Turf Postfertilization: Apply slow-release fertilizer after initial mowing and when grass is dry.
1. Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.4 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by the Engineer
1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

3.5 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations.

3.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established. D. Remove nondegradable erosion-control measures after grass establishment period.

3.7 MAINTENANCE SERVICE

A. Turf Maintenance Service: Provide full maintenance by skilled employees. Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area is planted and

continue until acceptable turf is established, but for not less than the following periods: 1. Sodded Turf: 30 days from date of Substantial Completion.

END OF SECTION 32 93 00

SECTION 33 11 00 WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Installation of water lines and hose bibs.

B. Specifications identify requirements for both small diameter water lines and large diameter water lines. When specifications for large diameter water lines differ from those for small diameter water lines, large diameter specifications will govern for large diameter pipe.

1.2 REFERENCES

A. ANSI A 21.11/AWWA C111 - Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
B. ANSI/NSF Standard 61 - Drinking Water System - Health Components.
C. ASTM A 36 - Standard Specification for Carbon Structural Steel.
D. ASTM A 536 - Standard Specification for Ductile Iron Castings.
E. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
F. ASTM B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes.
G. ASTM B 98 - Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
H. ASTM B 301 - Standard Specification for Free-Cutting Copper Rod, Bar, Wire, and Shapes.
I. ASTM B 584 - Standard Specification for Copper Alloy Sand Casting for General Application.
J. ASTM E 165 - Standard Practice for Liquid Penetrant Testing for General Industry.
K. ASTM E 709 - Standard Guide for Magnetic Particle Testing.
L. ASTM F 1674 - Standard Test Method for Joint Restraint Products for Use with PVC Pipe.
M. AWWA C 206 - Standard for Field Welding of Steel Water Pipe.
N. AWWA C 207 - Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 Inches through 144 inches.
O. AWWA C 210 - Liquid Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
P. AWWA C 222 - Polyurethane Coatings and Linings for Steel Water Pipe and Fittings.

1.3 SUBMITTALS

A. Conform to submittal requirements of applicable Section for type of pipe used.

B. Photographs: Submit photographs conforming to requirements of Division 1 prior to commencement of construction.

C. Submit videotapes conforming to requirements of Section 01323 - Construction Videotapes, if applicable.

D. Submit Lone Star notification transmittal number prior to beginning excavation.

E. Submit, a minimum of 15 days before beginning pipe laying operations, layout drawing identifying proposed sections for disinfecting, hydrostatic testing and site restoration for entire project for review and approval. Layout drawing to identify sequence of sections for:
   1. Disinfection; not to exceed 4,000 linear feet per section.
   2. Hydrostatic testing and transfer of services; to immediately follow sequence of disinfected section.
   3. Site restoration; not to exceed limits specified; sequence in order of disturbance.

PART 2 - PRODUCTS

2.1 HOSE BIBS

A. 30-inch above grade hose bib manufactured by Acorn Model 8156.

1. Other acceptable manufacturers for hose bibs for exterior applications shall also include Wade, Josam or Zurn, freeze resistant, 6" deep, wall hydrant. Nickel bronze finish or as required by architect. The supply line shall extend up within the insulated wall to a ball valve above the ceiling of the adjacent room. The hose bib shall be recessed in a cast metal box.

B. Details:

1. ¾-inch galvanized hose bib with a ¾" brass shut-off valve and ¾" back flow preventor.
2. Attached to hose bib, there is a 4-inch steel tubing (hot dip galvanized) hose bibs to sit on a 2-inch concrete pad.
3. Hose bibs shall be anti-freeze and anti-siphon.
4. Wall mounted with cast metal box.

C. For additional details, refer to Hose Bib Detail in project drawings.

2.2 PIPE MATERIALS

A. Install pipe materials which conform to Division 33.

B. Conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and have certified by an organization accredited by ANSI.

C. Type of pipe materials used is Contractor's option unless specifically identified on Drawings.

D. Provide minimum of 3/8 inch inside joint recess between ends of pipe in straight pipe sections.

2.3 WELDED JOINT PROTECTION FITTING FOR SMALL DIAMETER STEEL PIPE

A. Cylindrical Corrosion Barrier: Provide approved cylindrical corrosion barrier.

B. O-rings: Conform to National Sanitary Foundation requirements.

2.4 RESTRAINED JOINTS

A. Ductile-Iron Pipe: See Division 33.

B. PVC Pipe: See Division 33. Perform hydrostatic testing in accordance with ASTM F 1674.

C. Prestressed Concrete Cylinder Pipe, Bar-Wrapped Pipe and Steel Pipe: Welded joints (see Paragraph 3.06.C).

D. Except for trenchless installation, restrained Joints where required on DIP and PVC pipe are allowed with the following requirements as an alternative to the pipe with an integral restrained joint system:

1. Restraint Devices: Manufacture of high-strength ductile iron, ASTM A 536. Working pressure rating twice that of design test pressure.
2. Bolts and Connecting Hardware: High-strength low-alloy material in accordance with ANSI A21.11/AWWA C111.

PART 3 - EXECUTION

3.1 PREPARATION

A. Conform to applicable installation specifications for types of pipe used.

B. Employ workmen who are skilled and experienced in laying pipe of type and joint configuration being furnished. Provide watertight pipe and pipe joints.

C. Lay pipe to lines and grades shown on Drawings.

D. Confirm 9 feet minimum separation from gravity sanitary sewers and manholes or separation of 4 feet minimum from force mains as specified in this Section in all directions unless special design is provided on Drawings.

E. Where above clearances cannot be attained, and special design has not been provided on Drawings, obtain direction from Project Manager before proceeding with construction.

F. Inform Project Manager if unmetered sprinkler or fire line connections exist which are not shown on Drawings. Make transfer only after approval by Owner's Representative.

G. For projects involving multiple subdivisions or locations, limit water line installation to maximum of two project site locations. Maximizing two pipe installation crews shall be permitted, unless otherwise approved by the Owner's Representative.

H. City of Houston Drinking Water Operations will handle, at no cost to Contractor, operations involving opening and closing valves for wet connections and for chlorination. Contractor is responsible for handling necessary installations and removal of blow-offs, chlorination and testing taps, and risers.

I. If asbestos-cement (A.C.) pipe is encountered, follow safety practices outlined in OSHA 29 CFR 1926.1101 – Asbestos. Refer to Section 02221 - Removing Existing Pavements and Structures for removing and disposing of A.C. Pipe.

J. For pipe diameters 36 inches and greater, clearly mark each section of pipe and fitting with unique designation on inside of pipe along with pressure class. Locate unique identifying mark minimum of 5 feet away from either end of each section of pipe. Provide one unique identifying mark in middle of each fitting. Place markings at consistent locations. Use permanent black paint and minimum letter height of 4 inches to mark designations.

K. Contractor is responsible for assuring chosen manufacturer fulfills requirements for extra fittings and, therefore, is responsible for costs due to downtime if requirements are not met.

L. Do not remove plugs or clamps during months of peak water demands; June, July and August, unless otherwise approved by Owner's Representative.

3.2 HANDLING, CLEANING AND INSPECTION

A. Handling:

1. Place pipe along project site where storm water or other water will not enter or pass through pipe.
2. Load, transport, unload, and otherwise handle pipe and fittings to prevent damage of any kind. Handle and transport pipe with equipment designed, constructed and arranged to prevent damage to pipe, lining and coating. Do not permit bare chains, hooks, metal bars, or narrow skids or cradles to come in contact with coatings. Where

required, provide pipe fittings with sufficient interior strutting or cross bracing to prevent deflection under their own weight.

3. Hoist pipe from trench side into trench by means of sling of smooth steel cable, canvas, leather, nylon or similar material.
4. For large diameter water lines, handle pipe only by means of sling of canvas, leather, nylon, or similar material. Slings shall be wide enough so as to. not tear or wrinkle tape layers.
5. Use precautions to prevent injury to pipe, protective linings and coatings.
   a. Package stacked pipe on timbers. Place protective pads under banding straps at time of packaging.
   b. Pad fork trucks with carpet or other suitable material. Use nylon straps around pipe for lift when relocating pipe with crane or backhoe.
   c. Do not lift pipe using hooks at each end of pipe.
   d. Do not place debris, tools, clothing, or other materials on pipe.
   e. Place pipe on timbers, tires or soil berms at the jobsite. Do not place pipe directly on ground.
6. Repair damage to pipe or protective lining and coating before final acceptance.
7. For cement mortar lined and coated steel pipe and PCCP, permit no visible cracks wider than 1/16"
   a. In surface laitance of centrifugally cast mortar.
   b. In sections of pipe with steel reinforcing collars or wrappers.
   c. Within 12 inches of pipe ends.
8. Repair pipe with visible cracks that exceed project specifications. If cracks cannot be repaired to specification remove from project site.

B. Cleaning: Thoroughly clean and dry interior of pipe and fittings of foreign matter before installation, and keep interior clean until Work has been accepted. Keep joint contact surfaces clean until jointing is completed. Do not place debris, tools, clothing or other materials in pipe. After pipe laying and joining operations are completed, clean inside of pipe and remove debris.

C. Inspection: Before installation, inspect each pipe and fitting for defects. Reject defective, damaged or unsound pipe and fittings and remove them from site.

3.3 EARTHWORK

A. Conform to applicable provisions of Division 31.

B. Bedding: Use bedding materials in accordance with Division 31.

C. Backfill: Use bank run sand on earth or native soil as specified in Division 31. Backfill excavated areas in same day excavated. When not possible, cover excavated areas using steel plates on paved areas an and other protective measures elsewhere.

D. Place material in uniform layers of prescribed density water tapping is not allowed.

E. Pipe Embedment, including 6-inc pipe bedding and backfill to 12 inches above top of pipe.

3.4 PIPE CUTTING

A. Cut pipe 12 inches and smaller with standard wheel pipe cutters. Cut pipe larger than 12 inches in manner approved by Project Manager. Make cuts smooth and at right angles to axis of pipe. Bevel plain end with heavy file or grinder to remove sharp edges.

3.5 PIPING INSTALLATION

A. General Requirements:
   1. Lay pipe in subgrade free of water.

2. Make adjustments of pipe to line and grade by scraping away subgrade or filling in with granular material.
3. Properly form bedding to fully support bell without wedging or blocking up bell.
4. Open Cut Construction: Keep pipe trenches free of water which might impair pipe laying operations. Grade pipe to provide uniform support along bottom of pipe. Excavate for bell holes after bottom has been graded and in advance of placing pipe. Lay not more than nominal city block length of not more than 300 feet of pipe in trench ahead of backfilling operations. Cover or backfill carefully and simultaneously on each side of pipe to avoid lateral displacement of pipe and damage to joints. If adjustment of pipe is required after it has been laid, remove and re-lay as new pipe.

B. Install pipe continuously and uninterrupted. Obtain Owner's approval prior to skipping any portion of Work.

C. Protection of Pipeline: Securely place stoppers or bulkheads in openings and in end of line when construction is stopped temporarily and at end of each day's work.

D. Perform Critical Location as shown on Drawings. Refer to Division 33 for additional requirements at critical locations.

E. Perform following additional procedures when working on plant sites.
1. Seventy-two hours prior to each plant shutdown or connection, schedule coordination meeting with Project Manager and Water Production personnel. At this meeting, present proposed sequencing of Work and verification of readiness to complete Work as required and within time permitted. Do not proceed with Work until Project Manager agrees key personnel, equipment and materials are on hand to complete Work.
2. Prior to fully excavating around existing piping, excavate as minimal as possible to confirm type and condition of existing joints. Verify size, type, and condition of pipe prior to ordering materials or fully mobilizing for Work.
3. Do not proceed with connections to existing piping and identified critical stages of work unless approved by Project Manager and City's Utility Maintenance Division operator is present to observe.
4. Coordinate with City Drinking Water Operations to obtain reduction in operating pressures prior to performing connections to existing piping.
5. Make connections to existing piping only when two valves are closed off between connection and source of water pressure. Do not make connection relying solely on one valve, unless otherwise approved by Project Manager.
6. Perform critical stages of Work identified on Drawings at night or during low water demand months as specified in Section 01110 - Summary of Work.
7. Excavation equipment used on plant sites to have smooth bucket; no teeth or side cutters.
8. Submit to Project Manager Lone Star Notification transmittal number prior to beginning excavation.
9. Before each "dig" with mechanical excavator, probe ground to determine potential obstructions. Repeat procedure until existing pipe is located or excavation reaches desired elevation. Perform excavations within one foot to existing piping by hand methods.
10. Provide adequate notice to Project Manager and pipe manufacturer's representative when connecting or modifying existing prestressed or pretension concrete cylinder pipe.
11. Provide field surveyed (horizontal and vertical elevations) "as-builts" of new construction and existing underground utilities encountered. Submit in accordance with Section 01330 - Submittal Procedures.

12. Prior to performing plant work to be done on weekend, provide list of sites and contact person with phone numbers to Project Manager by noon on Thursday of week. Contact person must be accessible during weekend, have Houston Metro Area phone number, and be authorized to make emergency decisions.
13. No night work or plant shutdown will be scheduled to begin two working days before or after designated City Holidays.

F. For tie-ins to existing water lines, provide necessary material on hand to facilitate connection prior to shutting down existing water line. Provide governing agency a minimum of two weeks' notice prior to shutting down existing water line.

3.6 JOINTS AND JOINTING

A. Rubber Gasketed Bell-and-Spigot Joints for Concrete Cylinder Pipe, Bar Wrapped Pipe PVC, Steel, and DIP:
1. After rubber gasket is placed in spigot groove of pipe, equalize rubber gasket cross section by inserting tool or bar recommended by manufacturer under rubber gasket and moving it around periphery of pipe spigot.
2. Lubricate gaskets with nontoxic water-soluble lubricant before pipe units are joined.
3. Fit pipe units together in manner to avoid twisting or otherwise displacing or damaging rubber gasket.
4. After pipe sections are joined, check each gasket to ensure that no displacement of gasket has occurred. If displacement has occurred, remove pipe section and remake joint as for new pipe. Remove old gasket and replace before remaking joint.
5. Where preventing movement of 16-inch diameter or greater pipe is necessary due to thrust, use restrained joints as shown on Drawings.
a. Include buoyancy conditions for soil unit weight when computing thrust restraint calculations.
b. Do not include passive resistance of soil in thrust restraint calculations.
6. Except for PVC pipe, provide means to prevent full engagement of spigot into bell as shown on Drawings. Means may consist of wedges or other types of stops as approved by Owner's Representative.

B. Flanged Joints where required on Concrete Cylinder Pipe, Bar Wrapped Pipe, Ductile Iron Pipe, or Steel Pipe:
1. AWWA C 207. Prior to installation of bolts, accurately center and align flanged joints to prevent over stressing of flanges, pipe and equipment. Align bolt holes to straddle vertical, horizontal or north-south center line. Do not exceed 3/64 inch per foot inclination of flange face from true alignment.
2. Use ring type or full-face gaskets for flanged joints. Provide 1/8-inch-thick cloth inserted rubber gasket material in accordance with AWWA C207. Cut gaskets at factory to proper dimensions.
3. Use galvanized or black nuts and bolts to match flange material. Use cadmium-plated steel nuts and bolts underground. Tighten bolts progressively to prevent unbalanced stress. Maintain at all times approximately same distance between two flanges at points around flanges. Tighten bolts alternatively (180º apart) until all are evenly tight. Draw bolts tight to ensure proper seating of gaskets. Provide Densco petroleum-based tape or approved equal for all exposed portions of nuts, bolts and pipe.
4. Full length bolt isolating sleeves and washers shall be used with flanged connections. Furnish kits in accordance with City of Houston's "Approved Products List."
5. For in-line flange joints 30 inches in diameter and greater and at butterfly valve flanges, provide Pyrox G-10 with nitrite seal, conforming to ANSI A 21.11 mechanical joint gaskets. For in-line flange joints sized between 12 inches in diameter and greater and 24 inches in diameter and smaller, provide Phenolic PSI with nitrite seal gasket conforming to ANSI A 21.11 mechanical joint gaskets.

C. Welded Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe, Steel Pipe):

1. Prior to starting work, provide certification of qualification for welders employed on project for type of work procedures and positions involved.
2. Joints: AWWA C 206. Full-fillet, single lap-welded slip-type either inside or outside, or double butt-welded type; use automatic or hand welders; completely penetrate deposited metal with base metal; use filler metal compatible with base metal; keep inside of fittings and joints free from globules of weld metal which restrict flow or become loose. Do not use mitered joints. For interior welded joints, complete backfilling before welding. For exterior field-welded joints, provide adequate working room under and beside pipe. Use exterior welds for 30-inch and smaller.
3. Furnish welded joints with trimmed spigots and interior welds for 36-inch and larger pipe.
4. Bell-and-spigot, lap-welded slip joints: Deflection may be taken at joint by pulling joint up to ¾ inch as long as 1 ½ inch minimum lap is maintained. Spigot end may be miter cut to take deflections up to 5 degrees as long as joint tolerances are maintained. Miter end cuts of both ends of butt-welded joints may be used for joint deflections of up to 5 degrees.
5. Align piping and equipment so that no part if offset more than 1/8 inch. Set fittings and joints square and true, and preserve alignment during welding operation. For butt welded joints, align abutting ends to minimize offset between surfaces. For pipe of same nominal wall thickness, do not exceed 1/16 inch offset. Use line-up clamps for this purpose; however, take care to avoid damage to linings and costings.
6. Protect coal-tar-epoxy lining during welding by draping an 18-inch-wide strip of heat resistant material over top half of pipe on each side of lining holdback to avoid damage to lining by hot splatter. Protect tape coating similarly if external welding is required.
7. Welding Rods: Compatible with metal to be welded to obtain strongest bond, E- 70XX.
8. Deposit metal in successive layers to provide at least 2 passes or beads for automatic welding and 3 passes or beads for manual welding in completed weld.
9. Deposit no more than 1/4 inch of metal on each pass. Thoroughly clean each individual pass with wire brush or hammer to remove dirt, slag or flux.
10. Do not weld under weather condition that would impair strength of weld, such as wet surface, rain or snow, dust or high winds, unless work is properly protected.
11. Make tack weld of same material and by same procedure as completed weld. Otherwise, remove tack welds during welding operation.
12. Remove dirt, scale, and other foreign matter from inside piping before tying in sections, fittings, or valves.
13. Welded Joints for Large Diameter Water Lines:
    a. Furnish pipe with trimmed spigots and interior welds for 36-inch and larger pipe.
    b. Use exterior welds for 30-inch and smaller.
    c. Only one end may be miter cut. Miter end cuts of both ends ot butt-welded joints may be used for joint deflections of up to 2 ½ degrees.
    d. For large diameter water lines, employ and independent certified testing laboratory, approved by Owner's Representative, to perform weld acceptance tests on welded joints. Include cost of such testing and associated work to accommodate testing in contract unit price bid for water line. Furnish copies of test reports to Owner's Representative for review. Owner's Representative has final decision as to suitability of welds tested.
        1) Weld acceptance criteria:
            a) Conduct in accordance with ASTM E165 - Standard Test Method for Liquid Penetrant Examination and ASTM E709 - Standard Guide for Magnetic Particle Examination. Use X-ray methods for butt welds, for 100 percent of joint welds.

b) Examine welded surfaces for the following defects:
   i. Cracking.
   ii. Lack of fusion/penetration.
   iii. Slag which exceeds one-third (t) where (t) equals material thickness.
   iv. Porosity/Relevant rounded indications greater than 3/16 inch; rounded indication is one of circular or elliptical shape with length equal to or less than three times its width.
   v. Relevant linear indications in which length of linear indication exceeds three times its width.
   vi. Four or more relevant 1/16-inch rounded indications in line separated by 1/16 inch or less edge to edge.

14. After pipe is joined and prior to start of welding procedure, make spigot and bell essentially concentric by jacking, shimming or tacking to obtain clearance tolerance around periphery of joint except for deflected joints.
15. Furnish each welder employed steel stencil for marking welds, so work of each welder can be identified. Mark pipe with assigned stencil adjacent to weld. When welder leaves job, stencil must be voided and not duplicated. Welder making defective welds must discontinue work and leave project site. Welder may return to project site only after recertification.
16. Provide cylindrical corrosion barriers for polyurethane or epoxy-lined steel pipe 24-inch diameter and smaller, unless minimum wall thickness is 0.5 inch or greater.
    a. In addition to welding requirements contained here in Paragraph 3.06, conform to protection fitting manufacturer's installation recommendations.
    b. Provide services of technical representative of manufacturer available on site at beginning of pipe laying operations. Representative to train welders and advise regarding installation and general construction methods. Welders must have 12 months prior experience All steel pipe is to have cutback 3/4 inch to no greater than 1 inch of internal diameter coating from weld bevel.
    c. Furnish steel fittings with cylindrical corrosion barriers with shop welded extensions to end of fittings. Extension length to measure no less than diameter of pipe. Shop apply lining in accordance with AWWA C 210 or AWWA C 222.
    d. All steel pipe receiving field adjustments are to be cold cut using standard practices and equipment. No cutting using torch is to be allowed.

D. Harnessed Joints (Concrete Cylinder Pipe, Bar Wrapped Pipe or Steel Pipe):
1. Use of snap-ring type restrained joints on pipe is limited to 20-inch through 48-inch diameters.
2. Position snap-ring joint bolt on top (12 o'clock portion). Provide minimum 1/2-inch joint recess. Use joint "diapers" minimum of 12 inches wide.
3. For field adjustments with deflections or joint offsets beyond manufacturer's recommendations:
   a. Field trim spigot.
   b. Do not engage ring.
4. Harnessed joints are not permitted in areas defined on Drawings as potentially petroleum contaminated material, in tunnels, or at bend greater than 5 degrees.
5. Install harness type joints including snap rings at straight sections of pipe.

E. Restrained Joints:
1. For existing water lines and water lines less than 16 inches in diameter, restrain pipe joints with concrete thrust blocks.

2. Thrust restraint lengths shown on Drawings are minimum anticipated lengths. These lengths are based on deflections or joint offsets indicated and on use of prestressed concrete cylinder pipe for large diameter lines and ductile iron pipe for small diameter lines. Adjustments in deflections or joint offsets or use of other pipe material may result in reduction or increase of thrust lengths. Perform calculations by pipe manufacturer to verify proposed thrust restraint lengths. Submit calculations for all pipe materials sealed by a registered Professional Engineer in State of Texas for review by Owner's Representative. Make adjustments in thrust restraint lengths at no additional cost to Owner.
3. Passive resistance of soil will not be permitted in calculation of thrust restraint for some pipe materials.
4. For 16-inch lines and larger use minimum 16-foot length of pipe in and out of joints made up of beveled pipe where restraint joint lengths are not identified on Drawings. Otherwise, provide restraint joints for a minimum length of 16 feet on each side of beveled joints.
5. Installation.
   a. Install restrained joints mechanism in accordance with manufacturer's recommendations.
   b. Examine and clean mechanism; remove dirt, debris and other foreign material.
   c. Apply gasket and joint NSF 61 FDA food grade approved lubricant.
   d. Verify gasket is evenly seated.
   e. Do not over stab pipe into mechanism.
6. Prevent any lateral movement of thrust restraints throughout pressure testing and operation.
7. Place 2500 psi concrete conforming to Division 32, for blocking at each change in direction of existing water lines, to brace pipe against undisturbed trench walls. Finish placement of concrete blocking, made from Type I cement, 4 days prior to hydrostatic testing of pipeline. Test may be made 2 days after completion of blocking if Type II cement is used.

F. Joint Grout (Concrete Cylinder Pipe, Bar Wrapped Pipe, Mortar Coated Steel Pipe):
1. Mix cement grout mixture by machine except when less than 1/2 cubic yard is required. When less than 1/2 cubic yard is required, grout may be hand mixed. Mix grout only in quantities for immediate use. Place grout within 20 minutes after mixing. Discard grout that has set. Retempering of grout by any means is not permitted.
2. Prepare grout in small batches to prevent stiffening before it is used. Do not use grout which has become so stiff that proper placement cannot be assured without retempering. Use grout for filling grooves of such consistency that it will adhere to ends of pipe.
3. Surface Preparation: Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces with wire brush or hammer to sound, clean surface. Remove rust and foreign materials from metal surfaces in contact with grout.
4. Follow established procedures for hot and cold weather concrete placement.
5. Complete joint grout operations and backfilling of pipe trenches as closely as practical to pipe laying operations. Allow grouted exterior joints to cure at least 1 hour before compacting backfill.
6. Grouting Exterior Joint Space: Hold wrapper in place on both sides of joint with minimum 5/8-inch-wide steel straps or bands. Place no additional bedding or backfill material on either side of pipe until after grout band is filled and grout has mechanically stiffened. Pull ends of wrapper together at top of pipe to form access hole. Pour grout down one side of pipe until it rises on other side. Rod or puddle grout to ensure complete filling of joint recess. Agitate for 15 minutes to allow excess water to seep through joint band. When necessary, add more grout to fill joint completely. Protect gap at top of joint band from backfill by allowing grout to stiffen or by covering with

structurally protective material. Do not remove band from joint. Proceed with placement of additional bedding and backfill material.

7. Interior Joints for Pipe 24 Inches and Smaller: Circumferentially butter bell with grout prior to insertion of spigot, strike off flush surplus grout inside pipe by pulling filled burlap bag or inflated ball through pipe with rope. After joint is engaged, finish off joint grout smooth and clean. Use swab approved by Project Manager for 20-inch pipe and smaller.
8. Protect exposed interior surfaces of steel joint bands by pointing with grout. Joint pointing may be omitted on potable water pipelines if joint bands are protected by zinc metallizing or other approved protective coatings.
9. Strike off grout on interior joints and make smooth with inside diameter of pipe.
10. When installed in tunnel or encasement pipe and clearance within casing does not permit outside grout to be placed in normal manner, apply flexible sealer, such as Flex Protex or equal, to outside joint prior to joint engagement. Clean and prime surfaces receiving sealer in accordance with manufacturer's recommendations. Apply sufficient quantities of sealer to assure complete protection of steel in joint area. Fill interior of joint with grout in normal manner after joint closure.
11. Interior Joints for Water Lines 30 Inches and Larger: Clean joint space, wet joint surfaces, fill with stiff grout and trowel smooth and flush with inside surfaces of pipe using steel trowel so that surface is smooth. Accomplish grouting at end of each work day. Obtain written acceptance from Project Manager of inside joints before proceeding with next day's pipe laying operation. During inspection, insure no delamination of joint mortar has occurred by striking joint mortar lining with rubber mallet. Remove and replace delaminated mortar lining.
12. Work which requires heavy equipment to be over water line must be completed before mortar is applied to interior joints.

G. Make curves and bends by deflecting or offsetting joints or other method as recommended by manufacturer and approved by Owner's Representative. Submit details of other methods of providing curves and bends which exceed manufacturer's recommended deflection or joint offset prior to installation.

1. Deflection of pipe joints shall not exceed maximum deflection recommended by pipe manufacturer, unless otherwise indicated on Drawings.
2. If deflection exceeds that specified but is less than 5 percent, repair entire deflected pipe section such that maximum deflection allowed is not exceeded.
3. If deflection is equal to or exceeds 5 percent from that specified, remove entire portion of deflected pipe section and install new pipe.
4. Replace, repair, or reapply coatings and linings as required.
5. Assessment of deflection may be measured by Project Manager at location along pipe. Arithmetical averages of deflection or similar average measurement methods will not be deemed as meeting intent of standard.
6. When rubber gasketed pipe is laid on curve, join pipe in straight alignment and then deflect or offset to curved alignment.

H. Closures Sections and Approved Field Modifications to Steel, Concrete Cylinder Pipe, Bar Wrapped Pipe and Fittings:

1. For pipe diameters 36 inches and greater, perform field welds on interior and exterior of pipe.
2. Apply welded-wire fabric reinforcement to interior and exterior of exposed interior and exterior surfaces greater than 6 inches in diameter. Welded-wire fabric: minimum W1; maximum spacing 2 inches by 4 inches; 3/8 inch from surface of steel plate or middle third of lining or coating thickness for mortar thickness less than 3/4 inch.
3. Fill exposed interior and exterior surfaces with non-shrink grout.

3.7 CATHODIC PROTECTION APPURTENANCES

A. Where identified on Drawings, modify pipe for cathodic protection as detailed on Drawings and specified. Unless otherwise noted, provide insulation kits including test stations at connections to existing water system or at locations to isolate one type of cathodic system from another type, between water line, access manhole piping and other major openings in water line, or as shown on Drawings.

B. Bond joints for pipe installed in tunnel or open cut, except where insulating flanges are provided. Weld strap, wire or clip between bell and spigot of each joint or as shown on Drawings. No additional bonding required where joints are welded for thrust restraint. Repair coatings as specified by appropriate AWWA standard, as recommended by manufacturer, and as approved by Owner's Representative.

C. Bonding Strap or Clip: Free of foreign material that may increase contact resistance between wire and strap or clip.

3.8 SECURING, SUPPORTING AND ANCHORING

A. Support piping, as shown on Drawings and as specified in this Section, to maintain line and grade and prevent transfer of stress to adjacent structures.

B. Where shown on Drawings, anchor pipe fittings and bends installed on water line by welding consecutive joints of pipe together to distance each side of fitting. Restrained length, as shown on Drawings, assumes that installation of pipe and subsequent hydrostatic testing begin upstream and proceed downstream, with respect to normal flow of water in pipe. If installation and testing differs from this assumption, submit for approval revised method of restraining pipe joints upstream and downstream of device used to test against (block valve, blind flange or dished head plug).

C. Use adequate temporary blocking of fittings when making connections to distribution system and during hydrostatic tests. Use sufficient anchorage and blocking to resist stresses and forces encountered while tapping existing water line.

3.9 POLYETHYLENE WRAP FOR DUCTILE IRON PIPE

A. Double wrap pipe and appurtenances (except fire hydrants and fusion bond or polyurethane coated fittings) with 8-mil polyethylene film.

B. Do not use polyethylene wrap if pipe is cathodically protected.

C. Conform to requirements of Division 33.

3.10 CLEANUP AND RESTORATION

A. Provide cleanup and restoration crews to work closely behind pipe laying crews and, where necessary, during disinfection and hydrostatic testing, service transfers, abandonment of old water lines, backfill and surface restoration.

B. Unless otherwise approved by Owner's Representative, comply with the following:
   1. Once water line is installed to limits approved in layout submitted, immediately begin preparatory work for disinfection effort.
   2. No later than three days after completing disinfection preparatory work, execute disinfection work.
   3. If City fails to perform initial disinfection of lines in accordance with Section 02514 - Disinfection of Water Lines, within seven days from submission of appropriate request,

and if approved by Project Manager, pipe laying operations may continue beyond approved limits until the City responds.

4. Immediately after transfer of services, begin abandonment of old water lines and site restoration.
5. Do not exceed a total of 50% of total project linear feet of disturbed right-of- way and easement until site is restored in accordance with Division 1.
6. Exceeding any of the above footage limitations shall be considered a material breach of the Contract and subject to termination in accordance with the General Conditions.

3.11 CLEANING PIPING SYSTEMS

A. Remove construction debris or foreign material and thoroughly broom clean and flush piping systems. Provide temporary connections, equipment and labor for cleaning. Owner's Representative must inspect water line for cleanliness prior to filling.

3.12 DISINFECTION OF WATER LINES

A. Conform to requirements of Division 33.

3.13 FIELD HYDROSTATIC TESTS

A. Conform to requirements of Division 33.

END OF SECTION 33 11 00

SECTION 33 44 00 STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Perform all work required to complete, as indicated by the Contract Documents, and furnish all supplementary items necessary for completion of all work specified in this Section.

B. The work included in this Section, while not all inclusive but listed as a guide, shall include furnishing all labor, tools, materials and incidentals required to complete the work; preparation of a trench safety plan and obtaining City approval of the trench safety plan; laying out all lines and structures; the complete installation of storm drains, grate inlets, catch basins, area drains, curb inlets, headwalls, etc. and cleaning up. For work within public rights-of-way and proposed easements, the Contractor shall comply with all requirements of the local governing standards, TXDOT standards, and with the standards and specifications stated herein. The most stringent shall apply.

1.2 RELATED SECTIONS

A. Section 31 20 00 Earthwork

1.3 STANDARDS

A. Construction will meet the requirements and recommendations of applicable portions of the Standards listed:
   1. American Society for Testing and Materials, ASTM.

1.4 JOB CONDITIONS

A. Site Information
   1. The data indicated in the geotechnical investigation is made available for the convenience of the Contractor. The Owner will not be responsible for interpretations of the geotechnical investigation made by the Contractor. Additional test borings and other exploratory operations may be made by the Contractor at no cost to the Owner.

B. Existing Utilities
   1. It shall be the Contractor's responsibility to verify the location (horizontal and vertical depth) of all utilities prior to beginning earthwork operations. If utilities are to remain in place, provide protection from damage during construction operations.
   2. If existing utilities are encountered during excavation, consult Engineer immediately for directions as to how proceed. Repair damaged utilities to satisfaction of the Owner.
   3. Do not interrupt existing utilities serving facilities occupied and used by Owner, except when permitted in writing by

PART 2 - PRODUCTS

2.1 STORM DRAINAGE PIPE

A. All storm drainage pipe 18 inches in diameter or larger, as well as all storm drainage pipe located under drive or parking pavement, shall be Class III, reinforced concrete pipe with tongue and groove joints and shall conform to the latest ASTM Designation C 76.

B. All storm drainage pipes smaller than 18 inches in diameter shall be HDPE storm piping or approved equal. HDPE storm pipe shall be installed per the manufacturer's recommendations.

C. Portland Cement shall be of a standard brand and shall conform to the latest ASTM Designation C 150 Type 1.

D. Mortar and grout shall be composed of two parts fine aggregate and one-part cement and mixed with water to produce a homogeneous mixture 1 of such consistency that it can be easily handled and spread by trowel. Mortar and grout which has been re-tempered or has attained its initial set shall not be used.

E. Aggregates for concrete shall be considered as either fine or coarse and shall meet the requirements of NCTCOG Item 2.1.

F. Concrete shall be composed of Portland cement, coarse aggregate, fine aggregate, water, mineral filler and/or admixtures if permitted by the Owner. Concrete shall have a minimum compressive strength at 28 days of not less than 3000 psi and shall have a maximum water-cement ratio of 7.0 gallons per sack, minimum cement content of 5.0 sacks per cubic yard, and a slump from two (2) to three (3) inches. Measuring materials, batching and mixing shall conform to ASTM Designation C 94.

G. Reinforcing steel shall conform to ASTM Designation A 615, Grade 60.

H. Cast iron rings, cover and grates shall be true to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blow holes and other defects in positions affecting their strength and value for the service intended. Angles shall be filleted and arises shall be sharp and true. Surfaces shall be machined where indicated or where otherwise necessary to secure true, flat surfaces. Cover and grates shall fit properly into frames, and seat uniformly and solidly.
   1. Castings shall conform to the following ASTM Designations:
      a. Gray-iron Castings A 48 Class 30
      b. Malleable Castings A 47 25018
      c. Ductile Iron Castings A 395 60-45-15

PART 3 - EXECUTION

3.1 EXCAVATION

A. The Contractor shall excavate all materials encountered regardless of the difficulties encountered. The ditch shall be no greater in width or depth than is necessary to permit construction in accordance with the Plans and these Specifications. The maximum width of trench at top of pipe without sheeting, shoring and bracing shall be as follows: Up to 33" External Diameter of Pipe + 16", 36" and larger External Diameter of Pipe + 24".

B. The Contractor shall provide sheeting, shoring and bracing, whenever the excavation or trench is more than five feet in depth and eight feet or more in length. When sheeting and bracing are necessary the trench or excavation shall be dug to such width that proper allowance is made for the space occupied by the sheeting. All sheeting, shoring and bracing shall have sufficient strength and rigidity to withstand the pressure exerted and protect all persons or property from injury or damage. Neither sheeting nor shoring shall be left in place, but shall be removed in such a manner as not to endanger or damage new or existing structures. 1 All holes or voids left by the removal of sheeting shall be backfilled.

C. Soft, spongy or otherwise unstable material which will not provide a firm foundation for the pipe shall be removed and replaced with a suitable selected material from the excavation or other sources approved by the Construction Manager and shall be compacted as provided in the Specifications. When unstable conditions are not corrected by the above means, the Contractor will be required to use rock, gravel, concrete or timber foundations. There will be no extra compensation for this work.

3.2 BEDDING

A. The bedding for the pipe, which shall provide a firm foundation of uniform density throughout the entire length of the pipe, shall be as designated on the drawings.

3.3 PLACING STORM SEWER

A. No pipe shall be laid until it has been inspected and approved. All pipes shall be laid and jointed in the dry. The pipe shall be laid up-grade beginning at the lower end of the line. Pipe shall be laid accurately to line and grade with the tongue end downstream entering the groove to full depth and in such manner as not to drag earth into the annular space for joint grouting. When the entering pipe has been checked for line and grade, the body of the pipe shall be backfilled with enough earth, rock or concrete on both sides to hold the pipe firmly in position.

3.4 PIPE JOINTS

A. The ends of the pipe shall be cleaned thoroughly and wetted before making the joint. The groove of the pipe as laid and the tongue of the pipe section being laid shall be plastered thoroughly with an even layer of mortar. The pipes shall then be pulled together taking care that the inner surfaces are flush and even. The entire inner circumference of the joints of pipe 24 inches and larger in diameter shall be sealed and packed with mortar and finished smooth. A bead shall be formed on the pipe exterior extending at least one inch on either side of the joint and of approximately semicircular cross section and covering the top half of the pipe circumference.

B. For pipe less than 24 inches inside diameter, a tight stopper of burlap or other equivalent materials shall be dragged through the pipe past the new joint. Curing compound shall be used to protect the mortar. No jointing shall be done when the atmospheric temperature is below 40°F. Mortar shall be protected from freezing temperatures for 48 hours after being applied to joints.

C. Alternate methods of joints may be used at the option of the Contractor. The alternate methods are (1) cold applied, plastic asphalt sewer joint compound, (2) rubber gasket and (3) cold applied performed plastic gaskets. If the alternate method is used it shall meet all requirements for materials and installation of TxDot Item 464.

3.5 PIPE CONNECTIONS

A. Wye Connections: The connection of one pipe to another may be accomplished with a precast wye or by means of pipe-to-pipe connection. A pipe-to-pipe connection shall be made by cutting a hole in the larger pipe slightly larger than the outside diameter of the pipe to be connected. The smaller pipe to be connected shall not project into the larger pipe. A concrete collar not less than six (6) inches thick and six (6) inches wide shall be placed around the smaller pipe on the exterior surface of the larger pipe.

B. End-To-End Connections: Wherever a smaller pipe is jointed end-to-end to a larger pipe, the inside tops of the two pipes shall be matched, unless otherwise shown on the Plans. The void between pipes shall be filled with cemented brickwork or where this is not possible the void shall be filled with concrete mortar. In either case, a concrete collar not less than six (6) inches thick and six (6) inches wide shall be placed around the pipes over the joint.

3.6 INLETS, DRAINS, CLEANOUTS AND MANHOLES

A. Inlets, drains, cleanouts and manholes shall be constructed as per the plans.

B. Grates shall have continuous and even bearing on frame and shall be set to avoid rocking.

C. Coordinate with paving construction to assure proper elevation of inlets as shown on plans.

D. Install and seal joints at connection pipes.

3.7 BACKFILL

A. After the pipe has been installed and the mortar joints completely set, selected material from the excavation at a moisture content with which the required density can be obtained shall be placed equally along both sides of the pipe in layers not exceeding six (6) inches loose depth. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted by hand or pneumatic tamper until the fill has reached an elevation of 12 inches above the top of the pipe.

B. The remainder of the backfill shall be placed in layers not exceeding eight (8) inches loose depth and shall be compacted by an approved method which will obtain the density of the adjacent undisturbed soil. Backfill for pipes under pavements shall be compacted as specified in section 31 2200, "Grading". Water jetting will not be permitted.

3.8 CLEAN UP

A. Upon completion of the work covered by this Section, the Contractor shall clear interior of piping and structures of dirt and other superfluous material by flushing or other means as approved by the Engineer. The Contractor shall also clean up all work areas by removing all debris, surplus materials, and equipment from the site. The ground surface shall be restored to within 0.10 foot of original condition. Excess trench excavation, which cannot be utilized onsite, shall be legally disposed of offsite at the Contractor's expense.

END OF SECTION 33 40 00

SECTION 33 46 16 SUBDRAINAGE FOR ATHLETIC FIELDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This specification describes 4-24 inch subdrainage storm pipe per (ASTM F2648) for use in gravity-flow land drainage applications.

1.2 SECTION INCLUDES

A. Contractor shall furnish all labor, tools, and equipment and perform all work necessary for, or incidental to, the supply and installation of pipe underdrains as shown in the drawings and specified herein. This work includes trenching placement of a rock and storm pipes (including perforated pipes). The work shall be coordinated with the work of all other trades and activities on the project.

B. Contractor shall furnish and install all supplementary and miscellaneous items, appurtenances and devices incidental to or necessary for a complete installation.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO).

B. ASTM International (ASTM).

1.4 PIPE REQUIREMENTS

A. All pipes shall be HDPE and have a smooth interior and annular exterior corrugations.
   1. ADS N-12 ST 1B pipe (ASTM F2648) or approved equivalent.
   2. 4-60 inches shall meet ASTM F2648.
   3. Manning's value "n" shall be 0.012.

1.5 JOINT PERFORMANCE

A. All pipes shall be joined using a bell & spigot joint meeting ASTM F2648. The joint shall be soil-tight, and gaskets shall meet ASTM F477.Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant, supplied by the manufacturer, shall be used on the gasket and ell during assembly. Solvent-cement joints are strictly prohibited.

1.6 FITTINGS

A. All pipe fittings and bell & spigot connections shall conform to ASTM F2306.

1.7 INSTALLATIONS

A. Shall be in accordance with ASTM D2321.

1.8 SUBMITTALS

A. Submit product data on perforated pipe and fittings.

END OF SECTION 33 46 16