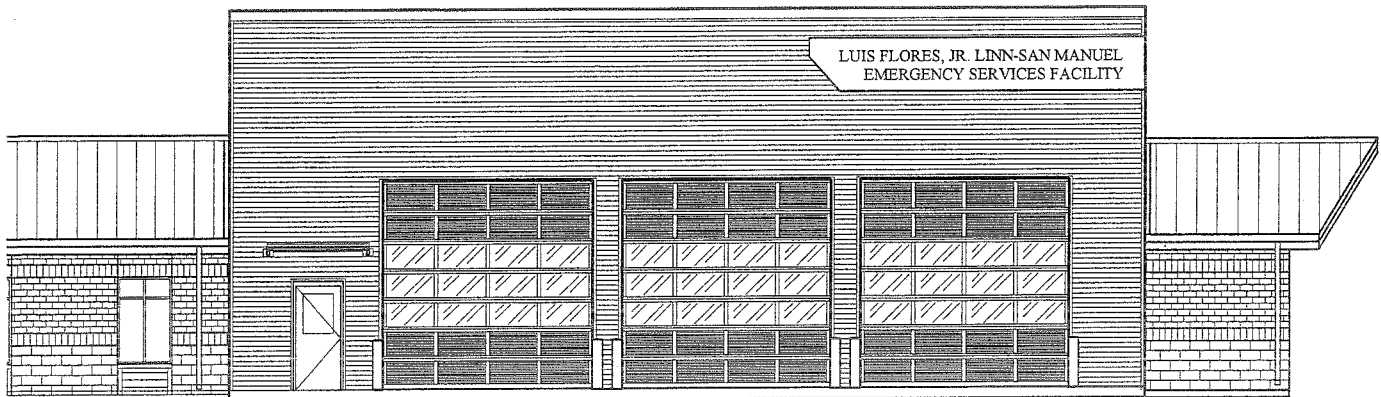


**Hidalgo County Precinct No. 4
Linn - San Manuel Emergency Services Facility
San Manuel, Texas**

**County of Hidalgo
2014-067-04-02-MSS-Hidalgo County Precinct No. 4
"Construction of the Linn - San Manuel Emergency Services Facility"**

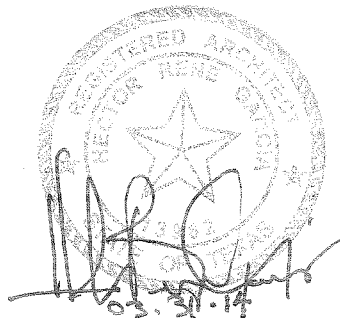


**Mata + Garcia Architects LLP
1314 Ivy Avenue
McAllen, Texas 78501
Tel: 956.631.1945
Fax: 956.631.1968**

**Sigma HN Engineers, PLLC
701 South 15th Street
McAllen, Texas 78501
Tel: 956.332.3206
Fax: 956.687.5561**

**Chanin Engineering
400 Nolana, Suite D
McAllen, Texas 78504
Tel: 956.687.9421
Fax: 956.687.3211**

**LeFevre Environmental
& Management Consulting LLP
612 Nolana
McAllen, Texas 78504
Tel: 956.687.5362
Fax: 956.687.5363**

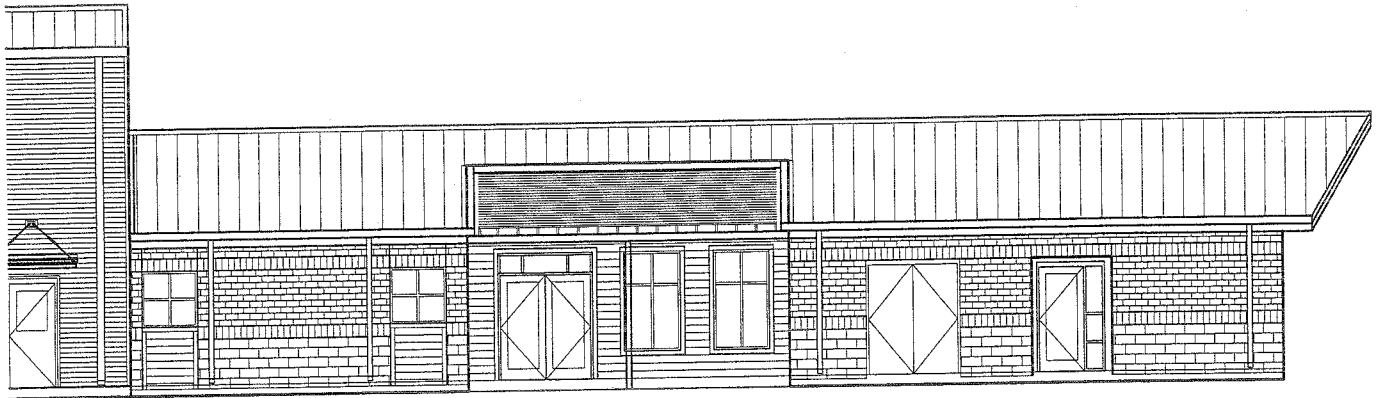


February 27, 2014

Volume 1
SET NO. _____

Hidalgo County Precinct No. 4
Linn - San Manuel Emergency Services Facility
San Manuel, Texas

County of Hidalgo
2014-067-04-02-MSS-Hidalgo County Precinct No. 4
"Construction of the Linn - San Manuel Emergency Services Facility"

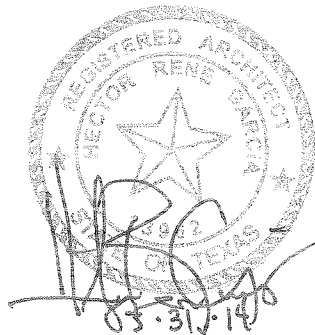


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& Management Consulting LLP**
612 Nolana
McAllen, Texas 78504
Tel: 956.687.5362
Fax: 956.687.5363



February 27, 2014

Volume 2
SET NO. _____

TITLE PAGE

TITLE AND LOCATION OF WORK

2014-067-04-02-MSS-Hidalgo County Precinct No. 4
"Construction of the Linn – San Manuel Emergency Services Facility
San Manuel, Texas

NAME AND ADDRESS OF OWNER

Hidalgo County / Hidalgo County Pct. 4
C/O Hidalgo County Purchasing Department
Hidalgo County New Administration Building
2802 South Business Hwy. 281
(Southeast of Canton Road and Business 281)
Edinburg, Texas 78539

TITLE OF DOCUMENTS BOUND HEREWITH

TITLE PAGE
INDEX OF DRAWINGS
TABLE OF CONTENTS
BIDDING REQUIREMENTS
CONTRACT DOCUMENTS

DATE: February 27, 2014

PROJECT NUMBER: 201307

TABLE OF CONTENTS

TITLE PAGE

INDEX OF DRAWINGS

HIDALGO COUNTY PURCHASING DEPARTMENT REQUIREMENTS

Invitation Letter and Advertisement	2 Pages
Legal Notice	9 Pages
Statement of Credentials	5 Pages
Exhibit C, Insurance Requirements	4 Pages
Exhibit D, CIQ Conflict of Interest Questionnaire	1 Page
Exhibit E, Proposer's Affidavit	1 Page
Certification Regarding Debarment	1 Page
Vendor/Bidder Application and W-9 Form	6 Pages
County Forms Submittal Check List	1 Page
Draft: AIA Doc A101-2007, Std. Form of Agreement Between Owner & Contractor	8 Pages
Draft: AIA Doc A201-2007, General Conditions of the Contract for Construction	51 Pages
Davis-Bacon Wage Rates	5 Pages

DIVISION ONE - GENERAL REQUIREMENTS

00020	REQUEST FOR BIDS	00020-1
00100	INSTRUCTIONS TO BIDDERS	00100-1 TO 3
00200	INFORMATION AVAILABLE TO BIDDERS	00200-1
	Attached Geotechnical Engineering Study by L&G Engineering Laboratory	
00300	BID FORM	00300-1 TO 3
00400	SUPPLEMENTS TO BID FORMS	00400-1
00500	AGREEMENT FORM	00500-1
00600	BONDS AND CERTIFICATE	00600-1
01010	SUMMARY OF WORK	01010-1
01020	ALLOWANCES	01020-1 TO 2
01027	APPLICATION FOR PAYMENT	01027-1 TO 2
01028	CHANGE ORDER PROCEDURES	01028-1 TO 3
01039	COORDINATION AND MEETINGS	01039-1 TO 3
01040	CONTRACT COORDINATION	01040-1
01045	CUTTING AND PATCHING	01045-1 TO 2
01050	FIELD ENGINEERING	01050-1
01090	REFERENCE STANDARDS	01090-1 TO 4
01100	ALTERNATES	01100-1
01300	SUBMITTALS	01300-1 TO 2
01340	SHOP DRAWINGS, PRODUCT DATA AND SAMPLES	01340-1 TO 3
01400	QUALITY REQUIREMENTS	01400-1 TO 5
01400	TESTING LABORATORY SERVICES	01400-1 TO 2
01500	CONSTRUCTION FACILITIES & TEMPORARY CONTROLS	01500-1 TO 2
01600	MATERIAL AND EQUIPMENT	01600-1 TO 2
01640	SUBSTITUTION AND PRODUCT OPTIONS	01640-1 TO 2
01700	CONTRACT CLOSE-OUT	01700-1 TO 3
01710	CLEANING	01710-1 TO 2
01730	OPERATING AND MAINTENANCE DATA	01730-1 TO 2
01740	WARRANTIES AND BONDS	01740-1
01780	PROJECT RECORD DOCUMENTS	01780-1 TO 3

DIVISION TWO – CIVIL ENGINEERING SPECIFICATONS

REFER TO SEPARATE INDEX

Sections included: Section 02040 Seeding For Erosion Control, Section 02084 Frames, Grates, Rings and Covers; Section 02200 Earthwork & Site Grading, Section 02233 Clearing and Grubbing, Section 02270 Soil Erosion and Sediment Control, Section 02316 Excavation and Backfill for Structures, Section 02317 Excavation and Backfill for Utilities, Section 02320 Utility Backfill Materials, Section 02506 Polyvinyl Chloride Pipe, Section 02512 Water Service Connections, Section 02513 Wet Connections, Section 02514 Disinfection of Water Lines, Section 02515 Hydrostatic Testing of Pressure Pipelines, Section 02521 Gate Valves, Section 02528 Polyethylene Wrap, Section 02531 Gravity Sanitary Sewers, Section 02533 Testing for Sanitary Sewers, Section 02535 Non-Metallic Utility Line Marking, Section 02720 Storm Drainage System, Section 02775 Concrete Sidewalks, section 02920 Top-soiling and Finished Grading.

DIVISION TWO – SITE CONTRUCTION (STRUCTURAL)

REFER TO SEPARATE INDEX

Sections included: Section 02055 Soils for Earthwork, Section 02230 Site Clearing, Section 02311 Rough Grading, Section 02315 Excavation and Fill, Section 02362 Termite Control.

DIVISION THREE – SPECIAL CONCRETE FLOOR FINISHES (ARCHITECTURAL)

035360	SPECIAL CONCRETE FLOOR FINISHES	03560-1 TO 5

DIVISION THREE – CONCRETE (STRUCTURAL)

REFER TO SEPARATE INDEX

Sections included: Section 03100 Concrete Forms and Accessories, Section 03200 Concrete Reinforcement, Section 03300 Cast-in-Place Concrete, Section 03350 Concrete Finishing, Section 03390 Concrete Curing, Section 03600 Grout.

DIVISION FOUR - UNIT MASONRY

NOT USED

DIVISION FIVE - STRUCTURAL STEEL (STRUCTURAL)

REFER TO SEPARATE INDEX

Sections included: Section 05120 Structural Steel

DIVISION SIX – WOOD (STRUCTURAL)

REFER TO SEPARATE INDEX

Sections included: Section 06112 Rough Carpentry, Section 06150 Wood Decking, Section 06173 Wood Truss

DIVISION SIX - WOOD AND PLASTIC

06001	CARPENTRY WORK	06001-1 TO 3
06100	ROUGH CARPENTRY	06100-1 TO 3
06114	WOOD BLOCKING AND CURBING	06114-1 TO 2
06220	FINISH CARPENTRY AND MILLWORK	06220-1 TO 10

DIVISION SEVEN - THERMAL AND MOISTURE PROTECTION

07125	COPPER FABRIC BASE FLASHING	07125-1 TO 3
07140	BELOW GRADE WATERPROOFING	07140-1 TO 5
07160	DAMPPROOFING ABOVE GRADE	07160-1 TO 3
07175	SELF ADHERING ROOF UNDERLAYMENT	07175-1 TO 2
07210	BUILDING INSULATION	07210-1 TO 3
07220	ROOF AND DECK INSULATION	07220-1 TO 2
07270	FIRESTOPPING AND FIRE SAFETY	07270-1 TO 10
07310	ASHPALT SHINGLE ROOFING	07310-1 TO 8
074113	METAL ROOF PANELS	074131-1 TO 8
074293	SOFFIT AND LINER PANELS	074293-1 TO
07462	SIDING	07462-1 TO 6
07611	PREFABRICATED METAL BUILDING ROOF CURBS	07611-1
07620	SHEET METAL FLASHING AND TRIM	07631-1 TO 2

07900	BUILDING SEALANTS	07900-1 TO 5

DIVISION EIGHT - DOORS AND WINDOWS

08100	HOLLOW METAL DOORS AND FRAMES	08100-1 TO 8
081423	ALUMINUM CLAD WOOD COMMERCIAL DOORS	081423-1 TO 6
08211	PLASTIC LAMINATE FACED WOOD DOORS	08211-1 TO 4
083513	ACCORDIAN FOLDING DOORS	083513-1 TO 4
085413	CASEMENT AND GLIDER WINDOWS	085413-1 TO 4
08625	TUBULAR DAYLIGHTING DEVICE	08625-1 TO 5
08710	FINISH HARDWARE	08710-1 TO 15
08730	DOOR AND MISCELLANEOUS ACCESSORIES	08730-1 TO 2
08840	MULTI-WALL POLYCARBONATE GLAZING SHEETS/SYSTEMS	08840-1 TO 4

DIVISION NINE - FINISHES

09250	GYPSUM WALLBOARD SYSTEMS	09250-1 TO 9
09310	CERAMIC TILE	09310-1 TO 4
09510	ACOUSTICAL LAY-IN CEILING	09511-1 TO 5
09650	RESILIENT BASE	09650-1 TO 4
09900	PAINTING AND STAINING	09900-1 TO 9

DIVISION TEN - SPECIALTIES

10101	MARKERBOARD AND TACKBOARD	10101-1 TO 3
10160	SOLID PHENOLIC TOILET PARTITIONS	10160-1 TO 3
10400	IDENTIFYING DEVICES	10400-1 TO 2
10800	TOILET AND BATH ACCESSORIES	10800-1 TO 4
10950	FIRE EXTINGUISHER AND CABINETS	10950-1 TO 2

DIVISION ELEVEN - EQUIPMENT

11400	FOODSERVICE EQUIPMENT	11400-1
11612	OBSERVATION MIRROR	11612-1

DIVISION TWELVE - FURNISHINGS

NOT USED

DIVISION THIRTEEN - SPECIAL CONSTRUCTION

13200	RAINWATER HARVESTING SYSTEM AND EQUIPMENT	13200-1 TO 6

DIVISION FOURTEEN - CONVEYING SYSTEM

NOT USED

DIVISION FIFTEEN - MECHANICAL SYSTEMS

REFER TO SEPARATE INDEX

DIVISION SIXTEEN - ELECTRICAL SYSTEMS

REFER TO SEPARATE INDEX

END OF SECTION

REQUEST FOR BIDS

TO SUPPLY HIDALGO COUNTY with sealed bids for: **-HIDALGO COUNTY PRECINCT NO. 4-“Construction of the Linn - San Manuel Emergency Service Facility” (Project # 2014-067-04-02-MSS).**

A BIDDER’S BOND from a reliable surety company licensed to operate in the State of Texas or certified Cashier’s Check, payable without recourse to the County of Hidalgo, for the amount of not less than **5%** of the total bid shall accompany the bid as guaranty that, if awarded the contract, the bidder will enter into a contract with the County of Hidalgo. Payment and Performance Bonds shall be executed except in the event into a single payment contract with the County of Hidalgo in lieu of a Performance Bond. In the event the total amount bid is \$25,000 or less, the successful contract has the option to enter into a single payment contract with the County of Hidalgo in lieu of a Payment and Performance Bond.

Bid Packets may be obtained at the office of the project architect **Hector Rene Garcia, AIA, Mata-Garcia Architects, L.L.P. 1314 West Ivy Avenue, McAllen, Texas 78501, (956) 631-1945** for the amount of **\$250.00.** General and/or Prime Contractors submitting bids and/or proposals to the County of Hidalgo shall be refundable.

PRE-BID CONFERENCE is scheduled for **Monday, March 24th, 2014 at 3:00 P.M.** at **HIDALGO COUNTY PURCHASING DEPARTMENT CONFERENCE ROOM-2812 S. Business Hwy 281, EDINBURG, TEXAS 78539**

UPON SUBMITTING SEALED BID, bidders are required to properly identify (handwritten, typed or printed) sealed envelope and/or packet as follows: Bidders’ name and address on the upper left hand corner of the sealed envelope and/or package and Bid No.:**2014-067-04-02-MSS- HIDALGO COUNTY PRECINCT NO. 4 -“Construction of the Linn - San Manuel Emergency Service Facility”** on the lower left hand corner of sealed envelope/and or packet. **OVERNIGHT MAIL MUST ALSO BE PROPERLY LABELED ON THE OUTSIDE OF EXPRESS ENVELOPE OR PACKAGE.**

The sealed bid must contain one (1) original and three (3) copies of bid and must be clearly identified and addressed for delivery to:

Martha L. Salazar, CPPB, Hidalgo County Purchasing Agent
Hidalgo County Purchasing Department

US Postal Mail/Courier Address

Hidalgo County New Administration Building
2812 S. Business Hwy 281
Edinburg, Texas 78539

Physical Location:

Hidalgo County New Administration Building
2802 S. Business Hwy. 281
(Southeast of Canton Rd & Business 281)
Edinburg, Texas 78539

BIDS ACCEPTANCE: Sealed bids will be accepted until **3:00 p.m. on Wednesday, April 2nd, 2014** at which time they will be opened in the Hidalgo County Purchasing Department Conference Room at **Physical Location: 2802 S. Business Hwy 281, Hidalgo County New Administration Building, Edinburg, Texas 78539.** NO FACSIMILES OR LATE ARRIVALS WILL BE ACCEPTED. ANY BID RECEIVED AFTER THAT TIME WILL NOT BE OPENED AND WILL BE RETURNED.

Attention is called to the fact that not less than, the federally determined prevailing (**Davis-Bacon and Related Acts**) wage rate, as issued and contained in the contract documents, must be paid on this project. In addition the successful bidder must ensure that employees and applicants for employment are not discriminated against because of race, color, religion, sex, age, disability or national origin.

BIDS MAY BE HELD by the County of Hidalgo for a period not to exceed ninety (90) days from the date of the opening of bids for the purpose of reviewing the bids and investigating the qualifications of bidders, prior to awarding of the contract.

THE COUNTY reserves the right to refuse and reject any/all bids and to waive any/all formalities or technicalities, or accept the bids considered the best and most advantageous to the County.

Typed-written bidding RFI’s shall be e-mailed to: **Hector Rene Garcia, AIA, at hector@matagarcia-architects.com** . Please call 956-631-1945 to confirm receipt of RFI. RFI’s **will not be answered by phone.** NO HAND WRITTEN RFI’S will be processed/answered. All inquiries shall be forwarded by March 26th, 2014. Inquiries beyond this date will not be responded. Contact project architect’s office for copies of Addenda. All bidders who paid a deposit will be required to return Addenda as part of the Construction Documents in order to receive full deposit refund.

BY ORDER OF THE COMMISSIONERS COURT OF HIDALGO COUNTY, TEXAS on this the 6th day of March, 2014.

MARTHA L. SALAZAR, CPPB
HIDALGO COUNTY PURCHASING AGENT

REPORT ROAD HAZARDS@1-866-HCR-SAFE OR 1-866-427-7233

March 10th, 2014

Re: **HIDALGO COUNTY PRECINCT No. 4** **“Construction of the Linn - San Manuel
Emergency Service Facility”**
BID No. -2014-067-04-02-MSS

Dear Gentleman/Ladies:

Enclosed please find a Request for Bid (RFB) packet for your review and consideration.

Hidalgo County Purchasing Department welcomes and appreciates your participation in the bid process.

If any further assistance is required, please do not hesitate to call the Purchasing Department 956/318-2626.

Sincerely,

Martha L. Salazar, CPPB
Hidalgo County Purchasing Agent

MLS/mss

Enclosures



Hidalgo County Purchasing Department
2812 S. Business Highway 281
Edinburg, Texas 78539
(956) 318-2626/ Fax: (956) 318-2629

HIDALGO COUNTY PRECINCT No. 4
“Construction of the Linn - San Manuel Emergency Service Facility”
BID No. -2014-067-04-02-MSS

TABLE OF CONTENTS –for COUNTY'S FRONT END DOCUMENTS

Item	Description	No. of Pages
1.	Invitation Letter and Advertisement	2
2.	Legal Notice	9
3.	Statement of Credentials	5
4.	Exhibit C, Insurance Requirements	4
5.	Exhibit D, CIQ Conflict of Interest Questionnaire	1
6.	Exhibit E, Proposer's Affidavit	1
7.	Certification Regarding Debarment	1
8.	Vendor/Bidder Application and W-9 form	6
9.	County Forms Submittal Check List	1

The above mentioned items shall be found in this RFB packet. Should you find that any of the items are not attached in its entirety please contact Purchasing by calling (956) 318-2626, advise of missing documentation, and Purchasing will forward information either through facsimile or by U.S. Mail.

Thank you.



REQUEST FOR BIDS (RFB)

HIDALGO COUNTY PRECINCT No. 4

**“Construction of the Linn - San Manuel Emergency
Service Facility”**

BID No. -2014-067-04-02-MSS

Acceptance Date: **April 2, 2014 @ 3:00 PM**

Martha L. Salazar, CPPB, Purchasing Agent
Hidalgo County Purchasing Department

Project Buyer Contact Information:

Moises Salazar, Buyer III
(956) 292-7000 Ext. 4863
moises.salazar@co.hidalgo.tx.us

1. Sealed bids will be received for **“HIDALGO COUNTY PRECINCT NO. 4 - Construction of the Linn - San Manuel Emergency Service Facility”** in accordance with the specifications attached as Exhibit "A" hereto. Bids should address all specifications set forth. Bidders may suggest substitutions of features which they feel would be in the best interest of Hidalgo County ("County"). Strong rationale must be presented for any deviation from the specifications. Hidalgo County reserves the right to reject the deviation and its effect on the overall bid.
2. One (1) original and three (3) copies of all bids are required with the bidders name and return address clearly typed/printed on upper left hand corner and the proper notation clearly typed/printed on the lower left hand corner of the envelope and/or package: **"BID-2014-067-04-02-MSS- HIDALGO COUNTY PRECINCT NO. 4- CONSTRUCTION OF THE LINN - SAN MANUEL EMERGENCY SERVICE FACILITY"** and in County's Purchasing Department, physical address: 2802 S. Business Hwy 281, mailing address 2812 S. Business 281 New Administration Building,, Edinburg, Texas, **on or before 3:00 p.m., WEDNESDAY, April 2, 2014.**

NO FACSIMILES OR LATE ARRIVALS WILL BE ACCEPTED. ANY RFB RECEIVED AFTER THAT TIME WILL NOT BE OPENED AND WILL BE RETURNED. OVERNIGHT MAIL MUST ALSO BE PROPERLY LABELED ON THE OUTSIDE OF EXPRESS ENVELOPE OR PACKAGE WITH REFERENCE TO "REQUEST FOR BIDS -2014-067-04-02-MSS- HIDALGO COUNTY PRECINCT NO. 4 -CONSTRUCTION OF THE LINN - SAN MANUEL EMERGENCY SERVICE FACILITY".

WRITTEN QUESTIONS WILL BE ACCEPTED. Written RFI's shall be sent to the office of project architect: Mata-Garcia Architects, L.L.P. to the attention of Hector Rene Garcia, AIA, at hector@matagarcia-architects.com . Please call 956-631-1945 to confirm receipt of RFI. RFI's will not be answered by phone. NO HAND WRITTEN RFI'S will be answered. All inquiries shall be forwarded by **March 26th, 2013**. Inquiries beyond this date will not be responded. Contact project architect for copies of Addenda. All bidders who paid a deposit will be required to return Addenda as part of the Construction Documents in order to receive full deposit refund.

Hidalgo County reserves the right to refuse and reject any/all RFB and to waive any/all formalities or technicalities, or to accept the RFB considered the best and most advantageous to Hidalgo County

3. Hidalgo County reserves the right to: A. separate and accept, or eliminate any item(s) listed under this bid that it deems necessary to accommodate budgetary and/or operational requirements; B. reject any or all bids submitted and further reserves the right to design the evaluation criteria to be used in selecting the lowest and best bid for approval; and C. award the bid to one bidder or to multiple bidders if the County determines it is in its best interest to do so."
4. The Bidder shall not substitute items named in the bid without the express written consent of Hidalgo County. Failure of the delivered item(s) to perform as specified, or failure to meet the stated delivery schedule shall release Hidalgo County from all obligations to the contracting party with regard to the item(s) in question. In such event,

County may elect to award the contract to the next-lowest responsible bidder, or to reject all bids and re-advertise.

5. For work to be performed at a County owned or operated location, each bidder shall, in its sole discretion, visit the job site before preparing the bid and thoroughly familiarize himself/herself with existing conditions. Bidder should take field dimensions and note all circumstances which affect the dollar amount of the bid.
6. Descriptive specifications are referenced in this document to indicate the general kind and quality of equipment desired by Hidalgo County. Due to various styles and models of equipment, bidders are required to include illustrations, specifications, explanation of warranties, and service data with their bid including catalogue numbers and any necessary references.
7. No bid may be withdrawn within thirty (30) days from the scheduled time to open bids.
8. Proposed prices are to remain firm for a minimum of ninety (90) days after bid opening.
9. Any interpretations, amendments, corrections or changes to this bid document must be in a written addendum and signed by the County Judge or his designee. Addenda will be mailed to all who are known to have received a copy of the Request for Bids. Bidders shall acknowledge receipt of all addenda as a part of their bid.
10. County reserves the right to accept or reject any or all bids.
11. Costs are to be net F.O.B., County Prepaid.
12. County is exempt from Federal Excise Tax, State Tax and Local Tax. Do Not include tax in cost figure. If it is determined that tax was included in the cost figures it will not be included in the tabulation of any awards. Tax exemption certificates will be furnished upon request.
13. Funds for this procurement have been provided through the County budget for this fiscal year only. County, on an annual basis, has the right to reconsider a contract during the budget process for ensuing years if financial resources of County are insufficient to meet the liabilities of said contract. The award of a bid or contract hereunder will not be construed to create a debt of the County which is payable out of funds beyond the current fiscal year.
14. Upon award and prior to execution of a contract, Sole Proprietorships are required to submit a copy of their social security cards to the Hidalgo County Auditor's Office in order to establish an account with the County. All awarded vendors must submit a completed W-9 and a copy of their Federal ID Number Certificate.
15. DELIVERY INSTRUCTIONS:
 - . No deliveries accepted after 3:00 P.M., Monday-Friday.
 - . At least seventy two (72) hours prior notice of delivery must be given to Martha L. Salazar, Purchasing Agent before delivery will be accepted.
 - . If you need additional information call the office listed below:

Hidalgo County Purchasing Department
Martha L. Salazar, Purchasing Agent
(956) 318-2626

16. BILLING AND PAYMENT INSTRUCTIONS:

- . Invoices must include:
 - a) Name and address of successful bidder
 - b) Name and address of receiving department or official
 - c) Purchase Order Number (if any)
 - d) Notation - **BID-2014-067-04-02-MSS- HIDALGO COUNTY PRECINCT NO. 4-"Construction of the Linn - San Manuel Emergency Service Facility"** Descriptive information as to the items or services delivered, including product code, item number, quantity, etc.
- . Discount payments will be considered when offered.
- . Contact person for Billing and Payment questions:

Ray Eufrazio, CPA, Hidalgo County Auditor
2802 S. Business Hwy 281
Edinburg, TX 78539
(956) 318-2511

17. Schedule

Pre-Bid Conference,	3:00 PM	March 24 , 2014
Bid Opening,	3:00 PM	April 2 , 2014
Award of Contract		_____, 2014
Commence Work or Deliver Products		_____, 2014

HIDALGO COUNTY APPROVED HOLIDAYS

2014 YEAR	
New Year's Day	01/01/14
Martin Luther King Day	01/20/14
President's Day	02/17/14
Good Friday	04/18/14
Easter	04/21/14
Memorial Day	05/26/14
Independence Day	07/04/14
Labor Day	09/01/14
Veteran's Day	11/11/14
Thanks Giving Day	11/27/14 and 11/28/14
Christmas Day	12/25/14 and 12/26/14
New Years' Eve	12/31/14

18. Bid or Performance Bond and Debarment Certification; Payment Under Contract:

. If the contract proposed is for the construction of public works or is for a contract for goods & services exceeding \$100,000, all bidders shall furnish a good and sufficient bid bond in the amount of five percent of the total contract price. A bid bond must be executed with a surety company authorized to do business in Texas. All bidders are also required to furnish a certification or acknowledgment stating that the contractor or vendor is free from suspension or debarment pursuant to federal regulation 45CFR Part 76.

. Together with the signing of a contract or issuance of a purchase order following the acceptance of a bid, and prior to commencement of the actual work, the bidder shall furnish a performance bond to the County for the full amount of the contract, if that contract exceeds \$100,000.

. If the contract is for \$50,000 or less, no money will be paid to the contractor until completion and acceptance of the work or the fulfillment of the purchase obligation to the County, and, if applicable, the receipt by County of satisfactory evidence that all subcontractors and material men have been paid.

. If a contract is for the construction, alteration or repair of public buildings or public works, the contractor *shall* provide a payment bond for a contract in excess of Twenty Five Thousand Dollars (\$25,000.00), as required by Tex. Govt. Code Ch. 2253.

. For requirements contracts, bond requirements are determined by applying the proposed unit price to the estimated quantities included in the specifications.

19. Ethical Standards:

. It shall be a breach of ethics to offer, give or agree to give any elected official, department head or employee, or former elected official, department head or employee, of the County, or for any elected official, department head or employee or former elected official, department head or employee of the County, to solicit, demand, accept or agree to accept from another person, entity or organization, a gratuity or an offer of employment in connection with any decision, approval, disapproval, recommendation, preparation or any part of a program requirement or purchase request, influencing the content of any specification or procurement standard, rendering of advice, investigation, auditing, or in any other advisory capacity in any proceeding or application, request for ruling, determination, claim or controversy, or other particular matter pertaining to any program requirement or a contract or subcontract, or to any solicitation or proposal therefore pending before any department or agency of the County.

. It shall be a breach of ethics for any payment, gratuity or offer of employment to be made by or on behalf of a subcontractor under a contract to the prime contractor or higher tier subcontractor for any contract for the County, or any person associated therewith, as an inducement for the award of a subcontract or order.

- . No public official shall have an interest in a contract awarded hereunder except in accordance with Tex. Loc. Govt. Code Chapter 171.

- **NOTICE:**

ALL COMMUNICATIONS BY A VENDOR TO THE COUNTY, ITS OFFICIALS, AND DEPARTMENT HEADS REGARDING THIS PROCUREMENT SHALL BE DONE THROUGH THE HIDALGO COUNTY PURCHASING DEPARTMENT.

No vendor, its representative, agent, or employee shall engage in private communication with a member of the Hidalgo County Commissioners Court or county department heads regarding any procurement of goods or services by the County from the date that the Bid, RFP, or RFQ is released. No private communication regarding the purchase shall be permitted until the procurement process is complete and a purchase order is granted or a contract is entered into. Members of the commissioners court are required to make a reasonable effort to inform themselves regarding potential procurements and have a duty to inquire of vendors, their representatives or employees, the nature of any private communication being sought prior to engaging in any communication. "Private Communication" means communication with any vendor outside of a posted meeting of the governing body, a regular meeting of a standing or appointed committee, or a negotiation with a vendor which has been specifically authorized by the governing body.

20. Disclosure of Conflict of Interest

- . Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that any vendor, person, consultant or contractor considering doing business with Hidalgo County ("the County") to disclose in the Conflict of Interest Questionnaire (the "CIQ") attached as Exhibit D, the vendor, person, consultant or contractor's affiliation or business relationship that might cause a conflict of interest with the County. By law, the CIQ must be filed with the Hidalgo County Clerk's Office no later than the seventh business day after the date the person becomes aware of facts that require that statement to be filed. The disclosure requirement applies to a person or business who contracts or seeks to contract with Hidalgo County for the sale or purchase of property, goods or service. Any purchase order or contract resulting from this process shall be considered null and void if the successful bidder fails to comply with Texas Local Government Code Chapter 176. Vendors, consultants, contractors and others who desire to conduct business with Hidalgo County are encouraged to refer to Texas Local Government Code Chapter 176 for the details of this law. An offense under Texas Local Government Code Chapter 176 is a Class C Misdemeanor.

Please Submit completed CIQ forms to the Hidalgo County Clerk's Office located at 100 N. Closner, Edinburg, Texas 78539-Hidalgo County Courthouse
COMPLETION AND SUBMISSION OF FORM CIQ IS THE SOLE RESPONSIBILITY OF THE PROSPECTIVE BIDDER.

21. If, during the life of any contract or bid awarded, the successful bidder's net prices generally available to other customers for items awarded herein are reduced below the contracted price, it is understood and agreed that the benefits of such reduction shall be extended to County.

22. Bids, and all goods and services provided thereunder, shall comply with all federal, state and local laws concerning this type(s) of goods and/or services
23. Minimum Standards For Responsible Prospective Bidders: A prospective bidder must affirmatively demonstrate bidder's responsibility. A prospective bidder, by submitting a bid, represents to County that it meets the following requirements:
- . **Possess and submit a Certificate of Account Status indicating bidder is in "Good Standing" with the Texas Comptroller of Public Accounts if such bidder is incorporated in the State of Texas. If the bidder is not incorporated with the Texas, the bidder must submit the appropriate evidence of filing with the Texas Secretary of State stating that the business is authorized to transact business in Texas.**
 - . Possess or is able to obtain adequate financial resources as required to perform under the bid;
 - . Be able to comply with the required or proposed delivery schedule;
 - . Have a satisfactory record of performance;
 - . Have a satisfactory record of integrity and ethics;
 - . Be otherwise qualified and eligible to receive an award.
24. Successful bidder will pay or cause to be paid, without cost or expenses to County, all FICA, FUTA/SUTA and Federal Income Withholding Taxes of all employees, and all wages and benefits as required by Federal or State law. Successful bidder's officers, agents and/or employees will not be entitled to any benefits of an employee or elected official of County, including, but not limited to, benefits associated with County's civil service system.
25. Any contract award to a successful bidder will be in effect until (a) the contract expires, (b) delivery and acceptance of products, and/or performance of services ordered, or (c) terminated by County with thirty day's written notice prior to cancellation.
26. County reserves the right to enforce performance of any contract awarded hereunder in any manner prescribed by law or deemed to be in the best interest of the County in the event of breach or default by successful bidder; County reserves the right to terminate any contract immediately in the event a successful bidder fails to:
- A. Meet schedules;
 - B. Pay any required fees or taxes; or
 - C. Otherwise perform in accordance with the specifications.
27. Successful bidder shall defend, indemnify and save harmless County and all its elected officials, officers, agents and employees from all suits, actions, or other claims of any character, name and description brought for or on account of any injuries or damages received or sustained by any person, persons, or property on account of any negligent act or fault of the successful bidder, or of any agent, employee, subcontractor or supplier of successful bidder in the execution of, or performance under, any contract which may result from bid award or which arises from any event or casualty happening on or within County premises themselves or happening upon or in any halls, elevators, entrances, stairways or approaches of or to such County facilities. Successful bidder shall pay any judgment with costs which may be obtained against County growing out of such injury or

damages, and shall, upon request, provide a defense to County by counsel reasonably acceptable to County. Successful bidder's indemnity hereunder shall include, but is not limited to, claims relating to patent, copyright or trademark infringement, and the like, arising out of the goods and services provided by successful bidder.

28. Successful bidder shall warrant that all items/services shall conform with the specifications and/or all warranties provided under the Uniform Commercial Code and be free from all defects in material, workmanship and the like. Items supplied under a contract pursuant to this Request for Bids shall be subject to County's approval. Items found to be defective or not meeting specifications shall be replaced by successful bidder within two business days at no expense to County. Items not picked up within one (1) week after notification shall be deemed a donation to County and may be used or disposed of at County's discretion and without waiver of any other rights of County as to the item's nonconformity.
29. ***Vendors hereby assigns to purchaser any and all claims for overcharges associated with this contract which arise under the antitrust laws of the United States, 15 USCA, Section 1 et. seq., and which arise under the antitrust laws of the State of Texas, Bus. & Com. Code, Section 15.01, et. seq.***
30. This document and any disputes arising hereunder shall be governed and construed according to the laws of the State of Texas, and will be performable exclusively in Hidalgo County, Texas.
31. The successful bidder shall not assign, sell, transfer or convey its rights under any awarded contract, in whole or in part, without the prior written consent of County.

BIDDERS ACKNOWLEDGEMENT

Bid for

HIDALGO COUNTY PRECINCT NO. 4

“Construction of the Linn - San Manuel Emergency Service Facility”

BID-2014-067-04-02-MSS

To: Martha L. Salazar, CPPB, Purchasing Agent
Hidalgo County Purchasing Department
2802 S. Bus. Hwy. 281
Edinburg, Texas 78539

In accordance with the Specifications, and subject to all laws and regulations of the United States and state and local laws, the undersigned bidder proposes and commits to furnish all labor, equipment, material, software and services as set forth in the documents hereinbefore mentioned. The undersigned bidder further agrees, upon acceptance of its bid, to execute a contract and/or Purchase Order issued by Hidalgo County for performing and completing the work described in the Specifications within the time stated and for the prices proposed in the documents attached hereto and made a part hereof.

Bidder acknowledges receipt of all of the pages of the documents referenced in the Invitation to Bid Checklist presented in connection with this procurement. Bidder understands that Hidalgo County reserves the right to reject any or all bids and further reserves the right to design the evaluation criteria to be used in selecting the lowest and best bid.

Bidder agrees that this bid shall be good and may not be withdrawn for a period of ninety (90) calendar days after the scheduled closing time for receiving bids, as contained in the Specifications.

Respectfully submitted,

Bidder:

Address:

By:

Printed Name:

Title:

(This page must be submitted in response)

STATEMENT OF CREDENTIALS

- 1. GENERAL:** In order to assist the Owner in determining the ability of each Bidder to properly fulfill the requirements of this proposed contract, the Bidder will complete the following items. All questions must be answered and the data given must be clear and comprehensive. **This statement must be notarized.** If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information he/she desires.

Name of Bidder: _____

Address: _____

Date Organized: _____ Date Incorporated: _____

Office Number: _____ Fax Number: _____

Number of years in business under present name: _____

Type of work performed by your company: _____

Have you ever failed to complete any work awarded to you? _____

Have you ever defaulted on a contract? _____

- 2. EXPERIENCE:** The Bidder will give below a list of similar projects which he/she has completed within the last five (5) years.

1. Owner: _____

Address: _____

Ph/Fx Number: _____ Email: _____

Scope of Work Description: _____

Date Completed: _____ Total Cost: _____

2. Owner: _____

Address: _____

Ph/Fx Number: _____ Email: _____

Scope of Work Description: _____

Date Completed: _____ Total Cost: _____

3. Owner: _____

Address: _____

Ph/Fx Number: _____ Email: _____

Scope of Work Description: _____

Date Completed: _____ Total Cost: _____

4. Owner: _____

Address: _____

Ph/Fx Number: _____ Email: _____

Scope of Work Description: _____

Date Completed: _____ Total Cost: _____

5. Owner: _____

Address: _____

Ph/Fx Number: _____ Email: _____

Scope of Work Description: _____

Date Completed: _____ Total Cost: _____

- 3. CONTRACTS ON HAND:** The Bidder shall provide below a list of any contracts/projects he/she currently has on hand:

4. **SUBCONTRACTORS:** List any subcontractors you propose to use on the Hidalgo County's project that will comprise at least 20% of the total project cost. Use additional page if necessary. This information is considered preliminary and may be revised prior if bid is awarded and re-submitted during the pre-construction phase. However, it is expressly understood that the use of any subcontractor other than those listed with bid shall require written approval from Hidalgo County.

Failure to submit the information as required may result in a disqualification of your bid.

5. **PERFORMANCE OF WORK BY BIDDER:** Except as otherwise provided, the bidder shall perform no more than eighty percent (80%) of the work with his own organization and no less than twenty percent (20%) of the work may be subcontracted.

The organization of the specifications into divisions, sections, articles, etc., and the arrangement and titles of project drawings shall not control the Bidder in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade.

Awarded bidder shall assign a project superintendent who is directly employed by the Bidder, that superintendent will be required to be on the job on a daily basis. No subcontractors will be allowed to act as project superintendents at any point during the construction of said project.

Bidder shall have a significant business presence with the Rio Grande Valley Area, the business must be headquartered in either Hidalgo, Cameron, or Starr County or a local office must be located in either of the three counties (Hidalgo, Cameron, Starr) with at least thirty percent (30%) of the total company workforce employed at the local office. County reserves the right to request payrolls and any necessary documentation to confirm that the local office meets these requirements.

Bidders shall carefully examine the plans, specifications and other documents, visit the site of the work, and fully inform themselves as to all conditions and matters which can affect the work or cost thereof. Should the bidder find discrepancies in, or omissions from the plans, specifications or other documents, or should he/she be in doubt as their meaning, he/she should at once notify the Engineer and obtain clarification by addendum prior to submitting any bid.

Bidder hereby certifies that said company carried liability coverage and workers compensation insurance coverage that meets the requirements set forth in this Request for Bids/Proposals when performing work on this project for Hidalgo County.

Furthermore, bidder certifies that any subcontractor on the project shall provide the said company with a certificate relating that all employees of the subcontractor also are provided with workers' compensation insurance coverage. Bidder will provide copies of all of these certificates to Hidalgo County during the course of the project for all subcontractors working on the project.

All subcontractors must comply with federally determined prevailing Davis-Bacon and Related Acts wage rate.

Hidalgo County encourages the hiring of minority women subcontractors and/or suppliers whenever and wherever feasible.

The undersigned hereby authorizes and requests any person, firm, or corporation to furnish any information requested by the owner in verification of the recitals comprising this Statement of Credentials.

Executed this _____ day of _____, 20_____.

By _____

Title _____

Subscribed and sworn to me this ____ day of _____, 20____.

By:_____

Notary Public in and for _____County, Texas

My commission expires _____

EXHIBIT “C”

Insurance Requirements

Applicable to the Acquisition of Goods and /or Services (other than Professional Services)

The Bidder awarded the contract shall furnish proof of insurance, which will also include any subcontractor that is subcontracted by the bidder in at least the following limits, to be in place prior to providing any services under this Contract and to continue at all times in force in effect during the term of this Contract:

1. A Five Hundred Thousand Dollar (\$500,000.00) Comprehensive General Liability insurance policy providing additional coverage to all underlying liabilities of County.
2. Automobile liability insurance policy with limits of at least Three Hundred Thousand Dollars (\$300,000.00) per person and Five Hundred Thousand Dollars (\$500,000.00) per occurrence. Coverage should include injury to or death of persons and property damage claims with limits up to Five Hundred Thousand (\$500,000.00) arising out of the services provided to County hereunder.
3. Uninsured/Underinsured motorist coverage in an amount equal to the bodily injury limits set forth immediately above;
4. Workers compensation insurance in amounts established by Texas law, unless the Bidder is specifically exempted from the Texas Workers Compensation Act, Texas Labor Code Chapter 401, et. seq.

Hidalgo County will only accept certificates of insurance on an Acord form (as attached hereto). Certificates of insurance naming County as an additional insured shall be submitted to County for approval prior to any services being performed by Contractor. Each policy of insurance required hereunder shall extend for a period equivalent to, or longer than the term of the Contract, and any insurer hereunder shall be required to give at least thirty (30) days written notice to the County prior to the cancellation of any such coverage on the termination date, or otherwise. This Contract shall be automatically suspended upon the cancellation, or other termination, of any required policy of insurance hereunder, and such suspension shall continue until evidence adequate replacement coverage is provided to County. If replacement coverage is not provided within thirty (30) days following suspension of the Contract, this Contract shall automatically terminate.

ACORD		CERTIFICATE OF INSURANCE	DATE (MM/DD/YY)
PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.		
INSURED	INSURERS AFFORDING COVERAGE		
	INSURER A:		
	INSURER B:		
	INSURER C:		
	INSURER D:		
	INSURER E:		

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THEIR TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS
A	GENERAL LIABILITY				EACH OCCURRENCE \$
	☐ COMMERCIAL GENERAL LIABILITY				FIRE DAMAGE (Any one fire) \$
	☐ CLAIMS MADE OCCUR				MEDICAL (Any one person) \$
	☐ OWNER'S & CONT. PROT				PERSONAL & ADV INJURY \$
	☐ OWNER'S PROTECTIVE LIABILITY				ANNUAL AGGREGATE \$
	☐ GEN'L AGGREGATE LIMIT APPLIES PER:				PRODUCTS - COMP/OP \$
	☐ POLICY ☐ PROJECT ☐ LOC				
B	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT (Ea accident) \$
	☐ ANY AUTO				BODILY INJURY (Per person) \$
	☐ ALL OWNED AUTOS				BODILY INJURY (Per accident) \$
	☐ SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident) \$
	☐ HIRED AUTOS				
	☐ NON-OWNED AUTOS				
	GARAGE LIABILITY				AUTO ONLY-EA ACCIDENT \$
	☐ ANY AUTO				OTHER THAN AUTO ONLY EA ACC AGG \$
C	EXCESS LIABILITY				EACH OCCURRENCE \$
	☐ OCCUR ☐ CLAIMS MADE				AGGREGATE \$
	☐ DEDUCTIBLE				\$
	☐ RETENTION \$				\$
					\$
D	WORKERS COMPENSATION AND EMPLOYER'S LIABILITY				WC STATUTORY LIMITS ☐ OTHER \$
					E.L. EACH ACCIDENT \$
					E.L. DISEASE-EA EMPLOYEE \$
					E.L. DISEASE-POLICY LIMIT \$
	OTHER				

DESCRIPTION OF OPERATIONS / LOCATION / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS		
County of Hidalgo shall be named as additional insured on all Commercial General Liability policies.		
CERTIFICATE HOLDER Hidalgo County Attn: Purchasing Department 2812 S Highway Bus. 281 Edinburg, Texas 78539	ADDITIONAL INSURED; INSURER LETTER: _____	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BY CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE _____

Insurance Requirement Acknowledgment

I, _____, authorized representative for _____,
Company/Vendor

hereby acknowledge receipt of the County's required insurance limits. Said requirements:

- ☐ will be acquired within 10 working days after notification from Purchasing Department of bid awarded by the Hidalgo County Commissioners' Court;
- ☐ will acquire additional amounts required to meet the County's requirements within 10 working days after notification from Purchasing Department of bid award by the Hidalgo County Commissioners' Court; currently carry the following:

Automobile Liability: \$_____ General Liability: \$_____

- ☐ have already been met, see attached copy of insurance certificate.

Authorized Representative

Date

Notice to Bidder:

A certificate of insurance for the required insurance limits shall be provided to the Purchasing Department's Contract Managers in order to qualify for award of bid and to execute a contract between your Company and the County

Failure to provide Certificates of Insurance to the Purchasing Department's Contract Managers will cause the bid award to be rescinded and re-awarded to next lowest bidder. Certificates of Insurance will be monitored and verified on a **quarterly basis** to ensure coverage policy is in place. It is the Company's obligation to maintain the appropriate insurance coverage throughout the term of the contract.

THIS FORM MUST ACCOMPANY BID PACKET

PROJECT REQUIREMENTS ACKNOWLEDGMENT

This is to certify that I, _____, possess all of the APPLICABLE:

1. Licenses: _____.
2. Bonds: _____.
3. Certificates: _____.
4. Permits: _____.
5. Other: _____.

necessary to carry out the required project. Furthermore, I am providing copies of the required documentation so that, if my company is awarded this bid, I may be eligible to enter into a contract with Hidalgo County and proceed to complete the project in a timely manner.

* Any licenses, bonds, certificates, permits, etc. which are required must be presented as part of the bid packet in order to expedite the bid evaluation process. Failure to provide said documentation will result in the disqualification of your bid.

Authorized Signature

Date

Company

Address

City, State, Zip

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. 1491, 80th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code by a person 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 person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

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

OFFICE USE ONLY

Date Received

1 Name of person 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 the originally filed questionnaire becomes incomplete or inaccurate.)

3 Name of local government officer with whom filer has employment or business relationship.

Name of Officer

This section (item 3 including subparts A, B, C & D) must be completed for each officer with whom the filer 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 filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer 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 10 percent or more?

☐ Yes ☐ No

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

4

Signature of person doing business with the governmental entity

Date

PROPOSER'S AFFIDAVIT
Exhibit "E"

PROPOSER'S AFFIDAVIT OF NON-COLLUSION NON-CONFLICT OF INTEREST, AND ANTI-LOBBYING

STATE OF TEXAS
COUNTY OF HIDALGO

Affiant, _____, being first duly sworn, deposes that:

(1) Affiant does hereby state neither the Proposer nor any of the Proposer's officers, partners, owners, agents, representatives, employees, or parties in interest, has in any way colluded, conspired, agreed, directly or indirectly with any person, firm, corporation, or other proposer, or potential proposer, to provide any money or other valuable consideration for assistance in procuring or attempting to procure a contract or fix the prices in the attached proposed or the proposal of any other proposer, and further states that no such money or other reward will be hereinafter paid.

(2) Affiant further states they have neither recommended or suggested to Hidalgo County or any of its officials or employees, any of the terms or provisions set forth in their Request for Proposal and subsequent agreement, except at a meeting open to all interested proposers, of which proper notice was given.

(3) Affiant, further states their officers, employees, or agents have not, and will not attempt to lobby, directly or indirectly, the Hidalgo County Commissioner's Court between proposal submission date and award by the Hidalgo County Commissioner's Court.

(4) Affiant further states no officer, or stockholder of the Proposer is a member of the staff, or related to any employee of the Hidalgo County except as noted herein below:

Signature/Title: _____

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public

My commission expires: _____, 20____

**Certification
Regarding Debarment, Suspension Ineligibility**

As is required by the Federal Regulations Implementing Executive Order 12549, Debarment and Suspension, 45 CFR Part 76, Government-wide Debarment and Suspension, in the applicant certifies, to the best of his or her knowledge and belief, that both it and its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department or agency;
- b. Have not within a three-year period preceding this bid/proposal and/or application been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state or local) transaction or contract under a public transaction, violation of federal or state antitrust statutes or commission of embezzlement, theft, theory, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a government entity with commission of any of the offenses enumerated herein; and
- d. Have not within a three-year period preceding this bid/proposal and/or application had one or more public transactions terminated of cause or default.

Signature:_____

Print Name:_____

Title:_____

Telephone Number:_____

Date:_____

If the proposer is unable to certify to all of the statements in this Certification, such proposer should attach an explanation to this proposal.

**Complete in print or type. Please return this application to the Hidalgo County Purchasing Department
thru Facsimile: (956) 318-2629 or (956) 292-7612
in person or regular mail to:
Mailing/Postal Address: 2812 S. Business Hwy. 281
Physical Address: 2802 S. Business Hwy. 281
Edinburg, Texas 78539
or e-mail: purchasing@co.hidalgo.tx.us**

(THIS PAGE MUST BE SUBMITTED WITH PROPOSAL)

HISTORICALLY UNDERUTILIZED BUSINESS (HUB) DECLARATION

The primary objective of the Hidalgo County HUB Program is to ensure Historically Underutilized Businesses receive a fair and equal opportunity for participation in the County's procurement process. This fact holds true for Services (Professional & Non-Professional), Commodities, and Construction contracts and any subcontracts thereto. The program strongly encourages Prime Contractors to provide subcontracting opportunities to Certified Hub Contractors/Vendors. Our goal for HUB contractor/vendor participation, as well as HUB subcontractor participation is 30%. To be considered as a "Certified HUB Contractor/Vendor" the contractor/vendor must have been certified by, and hold a current and valid certification with any of the three agencies listed below.

Have you been Certified as a HUB or an MBE/WBE source?: ☐ Yes ☐ No

If yes, by whom?: ☐ Texas Building & Procurement Commission ☐ Other _____

Indicate Certification No(s): _____ or Are Certificate(s) Attached?: ☐ Yes ☐ No

LIST OF CERTIFIED HUB SUBCONTRACTORS (Attach additional pages if necessary)

What percentage of the Bid, RFP, or RFQ is to be subcontracted with Certified HUB sources?: _____%
(List HUB Subcontractor information below).

HUB Subcontractor Name: _____ HUB Status: _____
Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ other
Address: _____ City: _____ State: _____ Zip: _____
Contact Person: _____ Title: _____ Phone No.: () _____
Subcontract Amount: \$_____ Description of Work to be Performed: _____

HUB Subcontractor Name: _____ HUB Status: _____
Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ other
Address: _____ City: _____ State: _____ Zip: _____
Contact Person: _____ Title: _____ Phone No.: () _____
Subcontract Amount: \$_____ Description of Work to be Performed: _____

HUB Subcontractor Name: _____ HUB Status: _____
Certifying Agency (Check all applicable): ☐ Texas Building & Procurement Commission ☐ other
Address: _____ City: _____ State: _____ Zip: _____
Contact Person: _____ Title: _____ Phone No.: () _____
Subcontract Amount: \$_____ Description of Work to be Performed: _____

(THIS PAGE MUST BE SUBMITTED WITH PROPOSAL)

Request for Taxpayer Identification Number and Certification

Give form to the
requester. Do not
send to the IRS.

Print or type See Specific Instructions on page 2.	Name (as shown on your income tax return)	
	Business name, if different from above	
	Check appropriate box: ☐ Individual/ Sole proprietor ☐ Corporation ☐ Partnership ☐ Other ▶	
	☐ Exempt from backup withholding	
	Address (number, street, and apt. or suite no.)	
	City, state, and ZIP code	
	List account number(s) here (optional)	
	Requester's name and address (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on Line 1 to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number								

or

Employer identification number								

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. person (including a U.S. resident alien).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the Certification, but you must provide your correct TIN. (See the instructions on page 4.)

Sign
Here

Signature of
U.S. person ▶

Date ▶

Purpose of Form

A person who is required to file an information return with the IRS, must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

U.S. person. Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

For federal tax purposes you are considered a person if you are:

- An individual who is a citizen or resident of the United States,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States, or

- Any estate (other than a foreign estate) or trust. See Regulations sections 301.7701-6(a) and 7(a) for additional information.

Foreign person. If you are a foreign person, do not use Form W-9. Instead, use the appropriate Form W-8 (see Publication 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien.

Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the recipient has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items:

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity not subject to backup withholding, give the requester the appropriate completed Form W-8.

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 28% of such payments (after December 31, 2002). This is called "backup withholding." Payments that may be subject to backup withholding include interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester, or
2. You do not certify your TIN when required (see the Part II instructions on page 4 for details), or
3. The IRS tells the requester that you furnished an incorrect TIN, or
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or
5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See the instructions below and the separate Instructions for the Requester of Form W-9.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Name

If you are an individual, you must generally enter the name shown on your social security card. However, if you have changed your last name, for instance, due to marriage without informing the Social Security Administration of the name change, enter your first name, the last name shown on your social security card, and your new last name.

If the account is in joint names, list first, and then circle, the name of the person or entity whose number you entered in Part I of the form.

Sole proprietor. Enter your individual name as shown on your social security card on the "Name" line. You may enter your business, trade, or "doing business as (DBA)" name on the "Business name" line.

Limited liability company (LLC). If you are a single-member LLC (including a foreign LLC with a domestic owner) that is disregarded as an entity separate from its owner under Treasury regulations section 301.7701-3, enter the owner's name on the "Name" line. Enter the LLC's name on the "Business name" line. Check the appropriate box for your filing status (sole proprietor, corporation, etc.), then check the box for "Other" and enter "LLC" in the space provided.

Other entities. Enter your business name as shown on required Federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name" line.

Note. You are requested to check the appropriate box for your status (individual/sole proprietor, corporation, etc.).

Exempt From Backup Withholding

If you are exempt, enter your name as described above and check the appropriate box for your status, then check the "Exempt from backup withholding" box in the line following the business name, sign and date the form.

Generally, individuals (including sole proprietors) are not exempt from backup withholding. Corporations are exempt from backup withholding for certain payments, such as interest and dividends.

Note. If you are exempt from backup withholding, you should still complete this form to avoid possible erroneous backup withholding.

Exempt payees. Backup withholding is not required on any payments made to the following payees:

1. An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2),
2. The United States or any of its agencies or instrumentalities,
3. A state, the District of Columbia, a possession of the United States, or any of their political subdivisions or instrumentalities,
4. A foreign government or any of its political subdivisions, agencies, or instrumentalities, or
5. An international organization or any of its agencies or instrumentalities.

Other payees that may be exempt from backup withholding include:

6. A corporation,

7. A foreign central bank of issue,
8. A dealer in securities or commodities required to register in the United States, the District of Columbia, or a possession of the United States,
9. A futures commission merchant registered with the Commodity Futures Trading Commission,
10. A real estate investment trust,
11. An entity registered at all times during the tax year under the Investment Company Act of 1940,
12. A common trust fund operated by a bank under section 584(a),
13. A financial institution,
14. A middleman known in the investment community as a nominee or custodian, or
15. A trust exempt from tax under section 664 or described in section 4947.

The chart below shows types of payments that may be exempt from backup withholding. The chart applies to the exempt recipients listed above, 1 through 15.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt recipients except for 9
Broker transactions	Exempt recipients 1 through 13. Also, a person registered under the Investment Advisers Act of 1940 who regularly acts as a broker
Barter exchange transactions and patronage dividends	Exempt recipients 1 through 5
Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt recipients 1 through 7 ²

¹See Form 1099-MISC, Miscellaneous Income, and its instructions.

²However, the following payments made to a corporation (including gross proceeds paid to an attorney under section 6045(f), even if the attorney is a corporation) and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees; and payments for services paid by a Federal executive agency.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are a single-owner LLC that is disregarded as an entity separate from its owner (see *Limited liability company (LLC)* on page 2), enter your SSN (or EIN, if you have one). If the LLC is a corporation, partnership, etc., enter the entity's EIN.

Note. See the chart on page 4 for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local Social Security Administration office or get this form online at www.socialsecurity.gov/online/ss-5.pdf. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/businesses/ and clicking on Employer ID Numbers under Related Topics. You can get Forms W-7 and SS-4 from the IRS by visiting www.irs.gov or by calling 1-800-TAX-FORM (1-800-829-3676).

If you are asked to complete Form W-9 but do not have a TIN, write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note. Writing "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded domestic entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if items 1, 4, and 5 below indicate otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). Exempt recipients, see *Exempt From Backup Withholding* on page 2.

Signature requirements. Complete the certification as indicated in 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Custodian account of a minor (Uniform Gift to Minors Act)	The minor ²
4. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
5. Sole proprietorship or single-owner LLC	The owner ³
For this type of account:	Give name and EIN of:
6. Sole proprietorship or single-owner LLC	The owner ³
7. A valid trust, estate, or pension trust	Legal entity ⁴
8. Corporate or LLC electing corporate status on Form 8832	The corporation
9. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
10. Partnership or multi-member LLC	The partnership
11. A broker or registered nominee	The broker or nominee
12. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name and you may also enter your business or "DBA" name on the second name line. You may use either your SSN or EIN (if you have one). If you are a sole proprietor, IRS encourages you to use your SSN.

⁴ List first and circle the name of the legal trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.)

Note. If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons who must file information returns with the IRS to report interest, dividends, and certain other income paid to you, mortgage interest you paid, the acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA, or Archer MSA or HSA. The IRS uses the numbers for identification purposes and to help verify the accuracy of your tax return. The IRS may also provide this information to the Department of Justice for civil and criminal litigation, and to cities, states, and the District of Columbia to carry out their tax laws. We may also disclose this information to other countries under a tax treaty, to federal and state agencies to enforce federal nontax criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism.

You must provide your TIN whether or not you are required to file a tax return. Payers must generally withhold 28% of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to a payer. Certain penalties may also apply.



HIDALGO COUNTY PRECINCT No. 4
"Construction of the Linn - San Manuel Emergency Service Facility"

BID No. -2014-067-04-02-MSS

SUBMITTAL CHECK LIST

The following list of forms must be included in the RFB response, failure to submit any of these forms may be considered non responsive.

Indicate with a check mark (✓) the Forms completed and included in response:

_____ Page 9 of Legal Notice

_____ Exhibit "C" -Acknowledgement forms (pages 3 and 4)

_____ Exhibit "D" -CIQ Form.

_____ Exhibit "E" –Proposers Affidavit

_____ Certification Regarding Debarment

_____ Vendor Bidder Application and IRS form W-9

_____ STATEMENT OF CREDENTIALS

_____ One (1) original and three (3) copies of complete Response, including any other documentation requested in this RFB not herein listed (i.e. Bid Form, Bid Bond, Sub-Contractors List, references, etc).

Firm Name: _____

Authorized Signature: _____

Date: _____

DRAFT AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

For the following PROJECT:

(Name and location or address)

Hidalgo County Precinct No. 4 –Construction of the Linn – San Manuel Emergency Service Facility

THE OWNER:

(Name, legal status and address)

County of Hidalgo
2812 S. Business Hwy 281
Edinburg, TX 78539

THE ARCHITECT:

(Name, legal status and address)

Mata-Garcia Architects, L.L.P.
1314 West Ivy Avenue
McAllen, TX 78501
(956) 631-1945

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	OWNER
3	CONTRACTOR
4	ARCHITECT
5	SUBCONTRACTORS
6	CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7	CHANGES IN THE WORK
8	TIME
9	PAYMENTS AND COMPLETION
10	PROTECTION OF PERSONS AND PROPERTY
11	INSURANCE AND BONDS
12	UNCOVERING AND CORRECTION OF WORK
13	MISCELLANEOUS PROVISIONS
14	TERMINATION OR SUSPENSION OF THE CONTRACT
15	CLAIMS AND DISPUTES

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.

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INDEX

(Numbers and Topics in Bold are Section Headings)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,
10.2.8, 13.4.2, 13.7.1, 14.1, 15.2

Addenda

1.1.1, 3.11.1

Additional Costs, Claims for

3.7.4, 3.7.5, 6.1.1, 7.3.7.5, 10.3, 15.1.4

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.5**

Additional Insured

11.1.4

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.5**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8, 7.3.8

All-risk Insurance

11.3.1, 11.3.1.1

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.6.3, 9.7.1, 9.10,
11.1.3

Approvals

2.1.1, 2.2.2, 2.4, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10,
4.2.7, 9.3.2, 13.5.1

Arbitration

8.3.1, 11.3.10, 13.1.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.4.1, 3.12.7, 4.1, 4.2, 5.2, 6.3.1, 7.1.2, 7.3.7, 7.4,
9.2.1, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1,
12.2.1, 13.5.1, 13.5.2, 14.2.2, 14.2.4, 15.1.3, 15.2.1

Architect, Limitations of Authority and
Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2,
4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4.1,
9.4.2, 9.5.3, 9.6.4, 15.1.3, 15.2

Architect's Additional Services and Expenses

2.4.1, 11.3.1.1, 12.2.1, 13.5.2, 13.5.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 4.2, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.4.1, 3.1.3, 3.5.1, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5.1, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14,
6.3.1, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2.1, 9.4.1, 9.5, 9.8.4,
9.9.1, 13.5.2, 15.2, 15.3

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.5

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.5.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1,
3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18,
4.1.2, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.4.2, 13.5,
15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3.7

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1, 5.2.1, 11.4.1

Binding Dispute Resolution

9.7.1, 11.3.9, 11.3.10, 13.1.1, 15.2.5, 15.2.6.1, 15.3.1,
15.3.2, 15.4.1

Boiler and Machinery Insurance

11.3.2

Bonds, Lien

7.3.7.4, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.7.4, 9.6.7, 9.10.3, 11.3.9, **11.4**

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.3

Certificates of Inspection, Testing or Approval
13.5.4

Certificates of Insurance

9.10.2, 11.1.3

Change Orders

1.1.1, 2.4.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11.1, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.6, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.3.1.2, 11.3.4, 11.3.9, 12.1.2, 15.1.3

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.1, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 7.4.1, 8.3.1, 9.3.1.1, 11.3.9

Claims, Definition of

15.1.1

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3.1, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4

Claims and Timely Assertion of Claims

15.4.1

Claims for Additional Cost

3.2.4, 3.7.4, 6.1.1, 7.3.9, 10.3.2, **15.1.4**

Claims for Additional Time

3.2.4, 3.7.4.6.1.1, 8.3.2, 10.3.2, **15.1.5**

Concealed or Unknown Conditions, Claims for
3.7.4

Claims for Damages

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Claims Subject to Arbitration

15.3.1, 15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.3.1, 11.3.6, 11.4.1, 15.1.4

Commencement of the Work, Definition of

8.1.2

Communications Facilitating Contract Administration

3.9.1, **4.2.4**

Completion, Conditions Relating to

3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 13.7, 14.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 13.7

Compliance with Laws

1.6.1, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 10.2.2, 11.1, 11.3, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 11.3.1, 13.2, 13.4.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, **6**

Construction Change Directive, Definition of
7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.3

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 11.3.9, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1, 11.1.3, 11.3.6, 11.4.1

Contract Documents, The

1.1.1

Contract Documents, Copies Furnished and Use of
1.5.2, 2.2.5, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

3.7.4, 3.8, 5.2.3, 7.2, 7.3, 7.4, **9.1**, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.3.1, 14.2.4, 14.3.2, 15.1.4, 15.2.5

Contract Sum, Definition of

9.1

Contract Time

3.7.4, 3.7.5, 3.10.2, 5.2.3, 7.2.1.3, 7.3.1, 7.3.5, 7.4, 8.1.1, 8.2.1, 8.3.1, 9.5.1, 9.7.1, 10.3.2, 12.1.1, 14.3.2, 15.1.5.1, 15.2.5

Contract Time, Definition of

8.1.1

CONTRACTOR

3

Contractor, Definition of

3.1, 6.1.2

Contractor's Construction Schedules

3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2

Contractor's Employees

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1,

Contractor's Liability Insurance

11.1

Contractor's Relationship with Separate Contractors and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3.7, 12.1.2, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 3.3.2, 3.18.1, 3.18.2, 5, 9.6.2, 9.6.7, 9.10.2, 11.3.1.2, 11.3.7, 11.3.8

Contractor's Relationship with the Architect

1.1.2, 1.5, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.3, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3.7, 12, 13.5, 15.1.2, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5.1, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the Work

3.3.2, 3.18, 5.3.1, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

9.7

Contractor's Right to Terminate the Contract

14.1, 15.1.6

Contractor's Submittals

3.10, 3.11, 3.12.4, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3, 11.1.3, 11.4.2

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.5, 7.3.7, 8.2, 10, 12, 14, 15.1.3

Contractual Liability Insurance

11.1.1.8, 11.2

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.2.5, 3.11

Copyrights

1.5, 3.17

Correction of Work

2.3, 2.4, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2

Correlation and Intent of the Contract Documents

1.2

Cost, Definition of

7.3.7

Costs

2.4.1, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.7, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.3, 12.1.2, 12.2.1, 12.2.4, 13.5, 14

Cutting and Patching

3.14, 6.2.5

Damage to Construction of Owner or Separate Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 11.1.1, 11.3, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4.1, 11.3.1, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.1.1, 11.3.5, 11.3.7, 14.1.3, 14.2.4, 15.1.6

Damages for Delay

6.1.1, 8.3.3, 9.5.1.6, 9.7, 10.3.2

Date of Commencement of the Work, Definition of

8.1.2

Date of Substantial Completion, Definition of

8.1.3

Day, Definition of

8.1.4

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 15.2, 6.3, 7.3.7, 7.3.9, 8.1.3, 8.3.1, 9.2.1, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.5.2, 14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification

9.4.1, 9.5, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance, Rejection and Correction of

2.3.1, 2.4.1, 3.5.1, 4.2.6, 6.2.5, 9.5.1, 9.5.2, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Defective Work, Definition of

3.5.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5.1, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 15.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1

Delays and Extensions of Time

3.2., 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4.1, 8.3, 9.5.1, 9.7.1, 10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5

Disputes

6.3.1, 7.3.9, 15.1, 15.2

Documents and Samples at the Site

3.11

Drawings, Definition of

1.1.5

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2, 11.1.2

Emergencies

10.4, 14.1.1.2, 15.1.4

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.1.1, 11.3.7, 14.1, 14.2.1.1

Equipment, Labor, Materials or

1.1.3, 1.1.6, 3.4, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work
1.1.3, 1.2.1, 1.2.2, 2.2.3, 2.2.5, 3.1, 3.3.1, 3.4.1, 3.5.1,
3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.5, 8.2,
9.5.1, 9.9.1, 10.2, 10.3, 12.2, 14.2, 14.3.1, 15.1.3
Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4.1, 9.5.1, 9.7.1,
10.3.2, 10.4.1, 14.3, 15.1.5, 15.2.5
Failure of Payment
9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2
Faulty Work
(See Defective or Nonconforming Work)
Final Completion and Final Payment
4.2.1, 4.2.9, 9.8.2, **9.10**, 11.1.2, 11.1.3, 11.3.1, 11.3.5,
12.3.1, 14.2.4, 14.4.3
Financial Arrangements, Owner's
2.2.1, 13.2.2, 14.1.1.4
Fire and Extended Coverage Insurance
11.3.1.1
GENERAL PROVISIONS
1
Governing Law
13.1
Guarantees (See Warranty)
Hazardous Materials
10.2.4, **10.3**
Identification of Subcontractors and Suppliers
5.2.1
Indemnification
3.17.1, **3.18**, 9.10.2, 10.3.3, 10.3.5, 10.3.6, 11.3.1.2,
11.3.7
Information and Services Required of the Owner
2.1.2, **2.2**, 3.2.2, 3.12.4, 3.12.10, 6.1.3, 6.1.4, 6.2.5,
9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.4, 13.5.1,
13.5.2, 14.1.1.4, 14.1.4, 15.1.3
Initial Decision
15.2
Initial Decision Maker, Definition of
1.1.8
Initial Decision Maker, Decisions
14.2.2, 14.2.4, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5
Initial Decision Maker, Extent of Authority
14.2.2, 14.2.4, 15.1.3, 15.2.1, 15.2.2, 15.2.3, 15.2.4,
15.2.5
Injury or Damage to Person or Property
10.2.8, 10.4.1
Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,
9.9.2, 9.10.1, 12.2.1, 13.5
Instructions to Bidders
1.1.1
Instructions to the Contractor
3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.5.2
Instruments of Service, Definition of
1.1.7
Insurance
3.18.1, 6.1.1, 7.3.7, 9.3.2, 9.8.4, 9.9.1, 9.10.2, **11**
Insurance, Boiler and Machinery
11.3.2

Insurance, Contractor's Liability

11.1

Insurance, Effective Date of
8.2.2, 11.1.2

Insurance, Loss of Use

11.3.3

Insurance, Owner's Liability

11.2

Insurance, Property

10.2.5, 11.3

Insurance, Stored Materials

9.3.2, 11.4.1.4

INSURANCE AND BONDS

11

Insurance Companies, Consent to Partial Occupancy

9.9.1, 11.4.1.5

Insurance Companies, Settlement with

11.4.10

Intent of the Contract Documents

1.2.1, 4.2.7, 4.2.12, 4.2.13, 7.4

Interest

13.6

Interpretation

1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written

4.2.11, 4.2.12, 15.1.4

Judgment on Final Award

15.4.2

Labor and Materials, Equipment

1.1.3, 1.1.6, **3.4**, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes

8.3.1

Laws and Regulations

1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13.1, 4.1.1, 9.6.4, 9.9.1,
10.2.2, 11.1.1, 11.3, 13.1.1, 13.4, 13.5.1, 13.5.2,
13.6.1, 14, 15.2.8, 15.4

Liens

2.1.2, 9.3.3, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of

12.2.5, 13.7, 15.4.1.1

Limitations of Liability

2.3.1, 3.2.2, 3.5.1, 3.12.10, 3.17.1, 3.18.1, 4.2.6,
4.2.7, 4.2.12, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 10.2.5, 10.3.3,
11.1.2, 11.2, 11.3.7, 12.2.5, 13.4.2

Limitations of Time

2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,
5.2, 5.3.1, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2.1, 9.3.1,
9.3.3, 9.4.1, 9.5, 9.6, 9.7.1, 9.8, 9.9, 9.10, 11.1.3,
11.3.1.5, 11.3.6, 11.3.10, 12.2, 13.5, 13.7, 14, 15

Loss of Use Insurance

11.3.3

Material Suppliers

1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.6, 9.10.5

Materials, Hazardous

10.2.4, **10.3**

Materials, Labor, Equipment and

1.1.3, 1.1.6, 1.5.1, 3.4.1, 3.5.1, 3.8.2, 3.8.3, 3.12, 3.13.1, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.7, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and Procedures of Construction

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien

2.1.2, 15.2.8

Mediation

8.3.1, 10.3.5, 10.3.6, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1

Minor Changes in the Work

1.1.1, 3.12.8, 4.2.8, 7.1, **7.4**

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7.1, 10.3.2, 11.3.1

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of
2.3.1, 2.4.1, 3.5.1, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Notice

2.2.1, 2.3.1, 2.4.1, 3.2.4, 3.3.1, 3.7.2, 3.12.9, 5.2.1, 9.7.1, 9.10, 10.2.2, 11.1.3, 11.4.6, 12.2.2.1, 13.3, 13.5.1, 13.5.2, 14.1, 14.2, 15.2.8, 15.4.1

Notice, Written

2.3.1, 2.4.1, 3.3.1, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 9.7.1, 9.10, 10.2.2, 10.3, 11.1.3, 11.3.6, 12.2.2.1, **13.3**, 14, 15.2.8, 15.4.1

Notice of Claims

3.7.4, 4.5, 10.2.8, **15.1.2**, 15.4

Notice of Testing and Inspections

13.5.1, 13.5.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.2.2, 9.6.6, 9.8, 11.3.1.5

Orders, Written

1.1.1, 2.3, 3.9.2, 7, 8.2.2, 11.3.9, 12.1, 12.2.2.1, 13.5.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Information and Services Required of the

2.1.2, **2.2**, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 11.3, 13.5.1, 13.5.2, 14.1.1.4, 14.1.4, 15.1.3

Owner's Authority

1.5, 2.1.1, 2.3.1, 2.4.1, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.1.3, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3.1, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.1.3, 11.3.3, 11.3.10, 12.2.2, 12.3.1, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Financial Capability

2.2.1, 13.2.2, 14.1.1.4

Owner's Liability Insurance

11.2

Owner's Loss of Use Insurance

11.3.3

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.4, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.3

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.2.5, 3.2.2, 3.11.1, 3.17.1, 4.2.12, 5.3.1

Partial Occupancy or Use

9.6.6, **9.9**, 11.3.1.5

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2.1, **9.3**, 9.4, 9.5, 9.6.3, 9.7.1, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7.1, 9.10.1, 9.10.3, 13.7, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.6, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, 9.8.2, 9.10, 11.1.2, 11.1.3, 11.4.1, 11.4.5, 12.3.1, 13.7, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.7.4, 9.6.7, 9.10.3, 11.4.9, **11.4**

Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 11.4.8, 14.2.1.2

PCB
10.3.1
Performance Bond and Payment Bond
7.3.7.4, 9.6.7, 9.10.3, 11.4.9, **11.4**
Permits, Fees, Notices and Compliance with Laws
2.2.2, **3.7**, 3.13, 7.3.7.4, 10.2.2
PERSONS AND PROPERTY, PROTECTION OF
10
Polychlorinated Biphenyl
10.3.1
Product Data, Definition of
3.12.2
Product Data and Samples, Shop Drawings
3.11, **3.12**, 4.2.7
Progress and Completion
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.3
Progress Payments
9.3, **9.6**, 9.8.5, 9.10.3, 13.6, 14.2.3, 15.1.3
Project, Definition of the
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.3**
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 4.1.1, 9.6.4, 9.9.1, 10.2.2, 11.1, 11.4, 13.1, 13.4, 13.5.1, 13.5.2, 13.6, 14, 15.2.8, 15.4
Rejection of Work
3.5.1, 4.2.6, 12.2.1
Releases and Waivers of Liens
9.10.2
Representations
3.2.1, 3.5.1, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.8.2, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.1, 4.2.2, 4.2.10, 5.1.1, 5.1.2, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.3, 5.3.1, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples by Contractor
3.12
Rights and Remedies
1.1.2, 2.3, 2.4, 3.5.1, 3.7.4, 3.15.2, 4.2.6, 4.5, 5.3, 5.4, 6.1, 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.2, 12.2.4, **13.4**, 14, 15.4

Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3.1, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.5.2
Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 11.4.7, 12.1.2
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.4.2, 9.10.1, 13.5
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.5
Special Inspections and Testing
4.2.6, 12.2.1, 13.5
Specifications, Definition of the
1.1.6
Specifications, The
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.11, 3.12.10, 3.17, 4.2.14
Statute of Limitations
13.7, 15.4.1.1
Stopping the Work
2.3, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4, 11.4.1.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2, 9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 11.4.7, 11.4.8, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.7, 9.2, 9.3, 9.8, 9.9.1, 9.10.2, 9.10.3, 11.1.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7

Subrogation, Waivers of

6.1.1, 11.4.5, **11.3.7**

Substantial Completion

4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2, 13.7

Substantial Completion, Definition of **9.8.1**

Substitution of Subcontractors
5.2.3, 5.2.4

Substitution of Architect
4.1.3

Substitutions of Materials
3.4.2, 3.5.1, 7.3.8

Sub-subcontractor, Definition of **5.1.2**

Subsurface Conditions
3.7.4

Successors and Assigns **13.2**

Superintendent **3.9, 10.2.6**

Supervision and Construction Procedures 1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.7, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.3 Surety

5.4.1.2, 9.8.5, 9.10.2, 9.10.3, 14.2.2, 15.2.7

Surety, Consent of
9.10.2, 9.10.3

Surveys
2.2.3

Suspension by the Owner for Convenience **14.3**

Suspension of the Work
5.4.2, 14.3

Suspension or Termination of the Contract
5.4.1.1, 11.4.9, 14

Taxes

3.6, 3.8.2.1, 7.3.7.4

Termination by the Contractor **14.1, 15.1.6**

Termination by the Owner for Cause 5.4.1.1, **14.2**, 15.1.6

Termination by the Owner for Convenience **14.4**

Termination of the Architect
4.1.3

Termination of the Contractor
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT **14**

Tests and Inspections

3.1.3, 3.3.3, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2,
9.10.1, 10.3.2, 11.4.1.1, 12.2.1, **13.5**

TIME

8

Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4.1, **8.3**, 9.5.1, 9.7.1,
10.3.2, 10.4.1, 14.3.2, 15.1.5, 15.2.5

Time Limits

2.1.2, 2.2, 2.4, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,
4.4, 4.5, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1,
9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 11.1.3,
11.4.1.5, 11.4.6, 11.4.10, 12.2, 13.5, 13.7, 14, 15.1.2,
15.4

Time Limits on Claims

3.7.4, 10.2.8, **13.7**, 15.1.2

Title to Work

9.3.2, 9.3.3

Transmission of Data in Digital Form

1.6

UNCOVERING AND CORRECTION OF WORK **12**

Uncovering of Work **12.1**

Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3

Unit Prices

7.3.3.2, 7.3.4

Use of Documents

1.1.1, 1.5, 2.2.5, 3.12.6, 5.3

Use of Site

3.13, 6.1.1, 6.2.1

Values, Schedule of

9.2, 9.3.1

Waiver of Claims by the Architect
13.4.2

Waiver of Claims by the Contractor
9.10.5, 11.4.7, 13.4.2, 15.1.6

Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 11.4.3, 11.4.5, 11.4.7, 12.2.2.1,
13.4.2, 14.2.4, 15.1.6

Waiver of Consequential Damages
14.2.4, 15.1.6

Waiver of Liens
9.10.2, 9.10.4

Waivers of Subrogation **6.1.1, 11.4.5, 11.3.7**

Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.4, 12.2.2, 13.7.1

Weather Delays

15.1.5.2

Work, Definition of

1.1.3

Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.8.5,
9.9.1, 9.10.2, 9.10.3, 11.4.1, 13.2, 13.4.2, 15.4.4.2

Written Interpretations

4.2.11, 4.2.12

Written Notice

2.3, 2.4, 3.3.1, 3.9, 3.12.9, 3.12.10, 5.2.1, 8.2.2, 9.7,
9.10, 10.2.2, 10.3, 11.1.3, 11.4.6, 12.2.2, 12.2.4, **13.3**,
14, 15.4.1



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), 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 pursuant to Paragraph 7.4. At the Owner's option, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.1.1 Contractor acknowledges and warrants that it has closely examined all the Contract Documents and is unaware of any instance where the documents are not suitable or are insufficient, to enable the Contractor to complete the Work in a timely manner for the Contract sum, and that they include all Work, whether or not shown or described, which reasonably may be inferred or useful for the completion of the Work in full compliance with all applicable codes, laws, ordinances, and regulations.

§ 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 except as provided in Paragraph 5.3 and 5.4 hereof, (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 of the Contractor 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.

§ 1.1.3.1 The Work shall include the obligation of the Contractor to visit the site of the project before submitting a proposal. Such site visit shall be for the purpose of familiarizing Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Document, including all existing site conditions, access to the site, physical characteristics of the site and surrounding areas. 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 identified.

§ 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 wherever located and whenever issued.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 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. Any differences between the requirements of the Drawings and the Specifications or any differences noted within the Drawings themselves or within the Specifications themselves have been referred to Owner and Architect by Contractor prior to the submission of bids and have been clarified by an Addendum issued to all bidders.

If such differences or conflicts were not called to Owner's and Architect's attention prior to submission of bids, Architect shall decide which of the conflicting requirements will govern based upon the following: the most stringent of the requirements will take precedence over the less stringent; the most expensive item will take precedence over the less expensive, and subject to the approval of Owner, Contractor shall perform the Work at no additional cost and/or time to Owner in accordance with the Architect's decision. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable as being necessary to produce the intended results.

§ 1.2.1.1 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

- .1 The Agreement;
- .2 Addenda, with those of later date having precedence over those of earlier date;
- .3 Supplemental Conditions;
- .4 The General Conditions of the Contract for Construction;
- .5 Specifications
- .6 Drawings, in the case of inconsistency between the Drawings and Specifications or within either

document, not clarified by Addendum, the better quality or greater quantity of Work shall be included in the Contract Documents. Clarifications of the inconsistency will be accomplished with the Contractor and, if necessary, an appropriate reduction in the contract will be accomplished with the Contractor and, if necessary, an appropriate reduction in the contract will be accomplished by Change Order. Figures given on drawings govern scale measurements. Large scale drawings take precedence over small scale drawings. Written words, take precedence over numbers. Handwritten documents take precedence over typewritten documents. Existing conditions take precedence over drawings and specifications for dimensions and shall be verified by the Contractor. The Contractor proceeds at his own risk if conflicts or discrepancies are not resolved prior to the execution of the Work.

§ 1.2.1.2 If Work is required in a manner to make it impossible to produce Work of the quality required by or reasonably inferred from the Contract Documents, or should discrepancies appear among the Contract Documents, Contractor shall request in writing an interpretation from Architect before proceeding with the Work. If Contractor fails to make such request, no excuse will thereafter be entertained for failure to carryout Work in the required manner or provide required guarantees, warranties, or bonds, and Contractor shall not be entitled to any change in the Contract Sum or the Contract Time on account of such failure.

§ 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.

§ 1.3 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 Instruments of Service, including the Drawings, Specifications, and other similar or related documents and copies thereof are furnished to Contractor for the purpose of performing the Work and are, and shall remain, the property of Owner and Owner will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment 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 this Project is not to be construed as publication in derogation of the Owner or Owners' consultants reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them 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 material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

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. The Commissioners Court of Owner, by majority vote, is the only representative of Owner, having the power to enter into a Contract, to execute a change order requiring an increase in the Contract Sum, or agree to an extension of the contractual completion date. The Commissioners Court shall designate, as appropriate, an authorized representative(s) to act on its behalf during the course of construction. In the event that an emergency changes the scope of the Work before the next regular meeting or in order to facilitate and expedite the timely completion of the Work, the Commissioners Court's authorized representative(s) may approve construction changes that do not exceed \$10,000.00 in increased costs. Any such changes shall be confirmed in writing between the Contractor and the Commissioner Court's authorized representative(s) and notice of such approved changes shall be given to the Commissioners Court at its next regular meeting. The Commissioners Court will act as soon as reasonably possible to avoid undue delays in the construction completion date.

§ 2.1.2 DELETED.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 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.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics and utility locations, and legal limitations 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. In connection with the foregoing, Contractor shall be solely responsible for locating (and shall locate prior to performing any Work) all utilities lines, telephone company lines and cable, sewer lines, water pipes, gas lines, electrical lines, including without limitation, all buried pipelines and buried telephone cables and shall perform the Work in such a manner so as to avoid damaging any such lines, cables, pipes and pipelines. Under this provision the Architect and Engineer are in no way relieved of their responsibilities outlined in the Contract or other attached contracts for identification of existing conditions.

§ 2.2.4 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.

§ 2.2.5 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 for use on this Project. All costs of reproduction are the responsibility of Contractor.

§ 2.3 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 or fails to remove and discharge (within ten (10) days) any lien filed upon Owner's or Landlord's property by anyone claiming by, through, or under Contractor or disregards the instructions of Architect or Owner when based on the requirements of 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, and any delay resulting from such Work stoppage shall not extend any Milestone Date identified in the Contract for Construction or the required dates of Substantial or Final Completion.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to 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.

§ 2.4.1 The rights stated in Article 2 shall be in addition to and not in limitation of any other rights of Owner granted in the Contract Documents or at law or in equity.

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 obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect 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.

§ 3.2 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 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect and Owner in writing any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for design information in such form as the Architect may require.

§ 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 and Owner in writing any nonconformity discovered by or made known to the Contractor as a request for design 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 make 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 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 unless the Contractor recognized or reasonably should have recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect and Owner.

§ 3.2.5 The Contractor shall not be entitled to additional compensation for the "rework portion" of any additional work caused by his failure to carefully study and compare the Contract Documents prior to execution of the Work.

§ 3.2.6 The Contractor shall make reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. 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.

§ 3.2.7 If, in the opinion of the Architect, 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 the 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 3.2.6, 3.2.7, and 3.12 before additional services are performed.

§ 3.2.8 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, Contractor shall promptly notify the architect in writing, providing substantiation for the position. Any necessary changes, including substitutions of materials, shall be accomplished by appropriate Modification.

§ 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, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect.

§ 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.

§ 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 Contractor shall be responsible to Owner for acts and omissions of Contractor's employees, Subcontractors, and their agents and employees, and other persons performing portions of the Work under contract Documents or other arrangements with Contractor.

§ 3.3.5 Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on the Work, including those with respect to the safety of persons and property and their protection from damages, injury, or loss. Contractor shall promptly remedy damage and loss to property at the site caused in whole or in part by Contractor, its Subcontractor, or anyone directly or indirectly employed by any of them or by anyone for whose acts they may be liable, except for damage or loss attributable solely to acts or omissions of Owner or Architect or by anyone for whose acts either of them may be liable and not attributable to the fault or negligence of Contractor, its Subcontractor, or anyone directly or indirectly employed by them. The foregoing obligations of Contractor are in addition to Contractor's obligations under other provisions hereunder.

§ 3.3.6 Contractor shall be responsible for inspection of portion of Work already performed under the Contract for Construction to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.7 Contractor has the responsibility to ensure that all material suppliers and Subcontractors, their agents, and employees adhere to the Contract Documents, and that they order materials on time, taking into account the current market and delivery conditions, and that they provide materials on time. Contractor shall coordinate its Work with that of all others on the Project, including of construction utilities.

§ 3.3.8 Contractor shall establish and maintain bench marks and all other grades, lines, and levels necessary for the Work; report errors or inconsistencies to Owner and Architect before commencing Work; and, if applicable, review the placement of the buildings and permanent facilities on the site with Owner and Architect after all lines are staked out and before foundation Work is started. Contractor shall provide access to the Work for Owner, Architect, other persons designated by Owner, and governmental inspectors. Any encroachments made by Contractor or its Subcontractors on adjacent properties caused by construction as revealed by an improvements survey, except for encroachments arising from errors or omissions not reasonably discoverable by Contractor in the Contract Documents, shall be the sole responsibility of Contractor, and Contractor shall correct such encroachments within thirty (30) days of the improvement survey (or as soon thereafter as reasonably possible), at Contractor's sole cost and expense, either by the removal of the encroachment (and subsequent reconstruction on the Project site) or agreement with the adjacent property owner(s) (in form and substance satisfactory to Owner in its sole discretion) allowing the encroachments to remain.

§ 3.3.9 Contractor shall verify at the Work site the measurements indicated on the Drawings and Specifications and shall establish correctly the lines, levels, and positions for the Work and be responsible for their accuracy and proper correlation with control lines, monuments, and data, as established by surveys furnished by Owner. Work shall be erected square, plumb, level, true to line and grade, in the exact plane and to the correct elevation and/or sloped to drain as indicated. To ensure the proper execution of its subsequent Work, Contractor shall measure all Work

already in place (including but not limited to utilities and grades installed or prepared by others) and shall at once report to Architect and Owner any discrepancy between said Work and the Drawings and Specifications for the Work.

§ 3.3.10 Any discrepancy or omission in the dimensions or elections shown on the Drawings and Specifications or found in previous Work which may prevent accurate layout or construction of the Work, shall immediately be reported by Contractor to Owner and Architect. If Contractor performs, permits, or causes performance of any Work when Contractor knows or reasonably should have known that such discrepancy or omission exists, without first obtaining further instruction from Architect or Owner, Contractor shall bear any and all costs arising therefrom including, without limitation, the costs of correction thereof without increase or adjustment in the Contract Sum. Omissions from the Drawings or Specifications, or the misdescription of details of Work which are reasonably inferable in order to carry out the intent of the Drawings and Specifications, or which are customarily performed, shall not relieve contractor from performing such omitted or mis-described details of the Work, and they shall be performed as if fully and correctly set forth and described in the Drawings and Specifications, at no additional cost to Owner.

§ 3.3.11 Contractor shall engage workers who are skilled in performing the Work, and all Work shall be performed with care and skill and in a good workmanlike manner under the full-time supervision of an approved engineer or foreman. Contractor shall be liable for all property damage, including repairs and replacements of the Work and economic losses, which proximately result from the breach of this duty. Contractor shall advise Architect:

1. if a specified product deviates from good construction practices;
2. if following the Specifications will affect any warranties; or
3. any objections which Contractor may have the Specifications.

Nothing contained in Subparagraph 1.1.3 shall alter the responsibilities established in this Subparagraph.

§ 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 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 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. By making requests for substitutions based on Subparagraph 3.4.2, Contractor:

- .1 represents that Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
2. represents that Contractor will provide the same warranty for the substitution that Contractor would for that specified;
3. certifies that the cost data presented is complete and includes all related costs under this Contract except 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 for the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 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. Contractor shall also be responsible for labor peace on the Project and shall at all times make its best efforts and judgments as an experienced Contractor to adopt and implement policies and practices designed to avoid Work stoppages, slowdowns, disputes, or strikes where reasonably possible and practical under the circumstances and shall at all times maintain Project-wide labor harmony. Except as specifically provided in Subparagraph 8.3 hereof, Contractor shall be liable to Owner for all damages suffered by Owner.

§ 3.4.4 Materials shall conform to manufacturer's standards in effect at the date of execution of the Agreement and shall be installed in strict accordance with manufacturer's directions. Contractor shall, if required by Owner or Architect, furnish satisfactory evidence as to the kind and quality of any materials. All packaged materials shall be

shipped to the site in the original containers clearly labeled, and delivery slips shall be submitted with bulk materials identifying thereon the source, and warranting quality and compliance with Contract Documents.

§ 3.4.5 When the Contract Documents require the Work, or any part of same, to be above the standards required by applicable laws, ordinances, rules and regulations, and other statutory provisions pertaining to the Work, such Work shall be performed and completed by Contractor in accordance with the Contract Documents.

§ 3.4.6 When the manufacturer's name, patent numbers, underwriter's labels, model numbers or similar identifying marks are required, such markings shall be located as inconspicuously as possible.

§ 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 the best 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. . Work, materials, or equipment not conforming to these requirements may be considered defective. If required by the Architect or Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 ALL WARRANTIES SHALL INCLUDE LABOR AND MATERIALS AND THE MANUFACTURER'S WARRANTY SHALL BE SIGNED BY SUBCONTRACTOR AND COUNTERSIGNED BY CONTRACTOR. ALL WARRANTIES SHALL BE ADDRESSED TO OWNER AND DELIVERED TO ARCHITECT UPON COMPLETION OF THE WORK AND BEFORE OR WITH THE SUBMISSION OF REQUEST FOR FINAL PAYMENT.

§ 3.5.3 Contractor shall issue in writing to Owner as a condition precedent to final payment a "general warranty" reflecting the terms and conditions of this Paragraph 3.5 for all Work under the Contract.

§ 3.5.4 The warranties provided in Paragraph 3.5 shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents, and such warranty or remedy required by law or by the Contract Documents, and such warranty shall be interpreted to require Contractor to replace defective materials and equipment and re-execute defective Work which is disclosed to the Contractor by the Owner within a period of one (1) year after final completion of the entire Work unless a longer time is specifically called for in the specifications. The Contractor shall assign all components, equipment and fixture warranties to the Owner and will deliver all manuals to the Owner at the completion of construction.

§ 3.5.5 Except when a longer warranty time is specifically called for in the Specification Sections or is otherwise provided by law, the General Warranty shall be for twelve (12) months and shall be in form and content otherwise satisfactory to Owner.

§ 3.5.6 Warranties shall become effective on a date established by Owner and Architect in accordance with the Contract Documents. This date shall be the Date of Substantial Completion of the entire Work, unless otherwise provided in any Certificate of Partial Substantial Completion approved by the parties.

§ 3.5.7 If the Architect considers it impractical, because of unsuitable test conditions or some other factors, to execute simultaneous final acceptance of all equipment, portions of properly installed and functioning equipment may be certified by Architect for final acceptance, subject to Owner's approval, when that portion of the system is complete and ready for operation as called for under Subparagraph 9.8.1.

§ 3.5.8 Contractor shall warrant for a period of twelve (12) months that the building(s) shall be watertight and leak proof at every point and in every area, except where leaks can be attributed to damage to the building(s) by external forces beyond Contractor's control. Contractor shall, immediately upon notification by Owner of water penetration, determine the source of water penetration and, at its own expense, do any Work necessary to make the building(s) watertight. Contractor shall also, at its own expense, repair or replace any other damaged material, finishes, and furnishings, damaged as a result of this water penetration, to return the building(s) to its (their) original condition.

§ 3.5.9 In addition to the foregoing stipulations, Contractor shall comply with all other warranties referred to in any portions of the Contract Documents or otherwise provided by law or in equity, and where warranties overlap, the more stringent requirement shall govern.

§3.5.10 If for any reason Contractor cannot warrant any part of the Work using material or construction methods that have been specified, or shown, it shall notify Owner and Architect in writing before the Contract is signed, giving reasons, together with the name of product and data on a substitution it can warrant.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall make application, 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 including, without limitation, street openings, sidewalk, and other obstructions, access over public ways and storage necessary for proper execution of the Contract and which are, legally required at the time bids are received or negotiations concluded.

§3.7.1.1 The Contractor shall also obtain all permits and approvals, and pay all fees and expenses, if any, associated with National Pollutant Discharge System (NPDS) regulations administered by the Environmental Protection Agency and state and local authorities, that require completion of documentation and/or acquisition of all permits for the Project. Contractor's obligations under this paragraph do not require it to perform engineering services during the pre-construction phase to prepare proper drainage for the construction sites. However, any drainage alterations made by Contractor during construction phase which modifies the original site drainage plan and requires the issuance of a permit shall be at Contractor's sole cost.

- a. The Owner shall pay directly to the governing authority the cost of all permanent property utility assessments and similar utility connection charges.
- b. The Contractor shall be responsible for obtaining and paying for all City and County Building Permits, Inspection Fees and Plan Checking Fees; temporary utility charges, tap charges and water meter charges and any other similar fees assessed by jurisdictional authorities having control over the Project.
- c. The Owner shall pay fees payable to the Texas Department of Licensing and Regulations (TDLR) for document review relative to the Elimination of Architectural Barriers Act and the Architect will submit the documents to the TDLR for review and approval.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders and all other requirements of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work (including, without limitation, the installation of any materials or equipment) that it knows or reasonably should have known would 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 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend to the Owner in writing, an equitable adjustment 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 in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15. No adjustment in the Contract Time or Contract Sum shall be permitted in connection with a concealed or unknown condition that does not differ materially from those conditions disclosed or based on data provided to Contractor and by the Contractor's prior inspections, tests, reviews, and pre-construction services for the Project; or by the Contractors inspections, tests, reviews and pre-construction services that Contractor had the opportunity and obligation to make in connection with the Project but did not do so.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect in writing. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 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, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 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. If a decision is needed to avoid a delay, Contractor shall notify Architect and Owner in writing sufficiently in advance of needed date to allow reasonable time for selections to be made.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Superintendent shall be satisfactory to the Owner and shall not be changed except with the consent of the Architect, unless the Superintendent leaves the employment of the Contractor. No increase in Contract Time or Contract Sum shall be allowed in the event the Owner or Architects object to any nominated superintendent. Such approval by the Owner shall not be unreasonably withheld.

§ 3.9.3 DELETED.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's review and approval a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised as required herein and 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 schedule shall indicate the proposed starting and completion dates for the various subdivisions of the Work as well as the totality of

the Work. The schedule shall be updated every thirty (30) days and submitted to Architect with Contractor's Applications for Payment. Each schedule shall contain a comparison of actual progress with the estimated progress for such point in time stated in the original schedule. If any schedule submitted sets such a date for Substantial Completion for the Work or any phase of the Work beyond the date(s) of Substantial Completion established in the Contract (as the same may be extended as provided in the Contract Documents), then Contractor shall submit to Architect and Owner for their review and approval a narrative description of the means and methods that Contractor intends to employ to expedite the progress of the Work to ensure timely completion of the various phases of the Work as well as the totality of the Work. To ensure such timely completion, Contractor shall take all necessary action including, without limitation, increasing the number of personnel and labor on the Project and implementing overtime and double shifts. In that event, Contractor shall not be entitled to an adjustment in the Contract Sum or the schedule.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's and Owner's approval. The Architect's and Owner's approval shall not unreasonably be 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, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 The process of approving Contractor's schedules and updates to Contractor's schedule shall not constitute a warranty by the Owner that any non-Contractor milestones or activities will occur as set out on Contractor's schedule. Approval of a Contractor's schedule does not constitute a commitment by the Owner to furnish any Owner-furnished information or material any earlier than Owner would otherwise be obligated to furnish that information or material under the Contract Documents. Failure of the Work to proceed in the sequence scheduled by 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 cost to a minimum. The construction schedule shall be in a detailed format satisfactory to the Owner and the Architect and shall also:

- .1 Provide a graphic representation of all activities and events that will occur during performance of the Work;
- .2 identify each phase of construction and occupancy; and
- .3 set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents hereinafter referred to as Milestone Dates.

§ 3.10.5 The Owner shall have the right to reschedule the time of day for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any rescheduling of performance of the Work under this Subparagraph 3.10.5 may be grounds for an extension of the Contract Time, if permitted under Subparagraph 8.3.1 and an equitable adjustments in the Contract Sum, if: (1) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, (2) such rescheduling is required for the convenience of the Owner and is not attributable to any act of omission of Contractor, and (3) if Owner agrees to the Contract Sum adjustment prior to any rescheduling.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections (all changes and selections to be approved by Owner and Architect in advance) made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be 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 At the Date of Substantial Completion and as a condition precedent to final payment, Contractor shall

furnish the following documents to Architect for submittal to Owner: Record Drawings showing the field changes and selections (all changes and selections to be approved by Owner and Architect in advance) affecting the general construction, mechanical, electrical, plumbing, and all other Work, and indicating the Work as actually installed. These shall consist of carefully drawn markings on a set of reproducible prints of Architect's Drawings obtained and paid for by Contractor. Contractor shall maintain at the job site one (1) set of Architect's Drawings and indicate thereon each field change as it occurs. The Contractor shall post all Addenda on Construction Documents prior to commencing work on 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 the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. 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 re-submittal. Additional service charges as outlined in 3.2.7 may be charged by the Architect in this event.

§ 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 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 requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. 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 cause such services or certifications to be provided by a properly licensed design professional and who shall comply with requirements of Owner regarding qualifications and insurance and, 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, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, 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. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.12.11 The Contractor shall submit Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents to the Architect at least 30 days prior to the date the Contractor needs the reviewed submittals returned. Where colors are to be selected by the Architect, the Contractor shall submit all Samples in adequate time to allow the Architect to prepare a complete selection schedule. In general, all submittals requiring color selection shall be submitted to the Architect within four weeks of the date of the Contract for construction.

§ 3.12.12 The Contractor shall submit the number of copies of Shop Drawings, Product Data, Samples and similar submittals which the Contractor and his Subcontractors need for their use plus two additional sets for the Architect and one additional set for each of the Architect's consultants involved with the particular section of work. Where shop drawings are involved, the Contractor shall submit one high quality reproducible transparency and one opaque print of the shop drawing for the Architect plus one additional opaque print for each of the Architect's consultants involved with the particular section of work. The reproducible transparency will be marked by the Architect and/or his consultants and returned to the Contractor for his use, distribution, correction or re-submittal as required. The Architect and his consultants will retain the marked up prints. After final review and correction of the submittal, the Contractor shall send two corrected sets to the Architect, and one to each of the Architect's consultants involved with the particular section of work.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.1 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 materials and equipment stored at the Project site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.

§ 3.13.2 The Contractor and any entity for whom the Contractor is responsible shall not erect any sign on the Project site without written consent of the Owner.

§ 3.13.3 Contractor shall ensure that the Work, at all times, is performed in a manner that affords 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 materials and equipment likely to cause hazardous conditions. Without limitation of any other provision on the Contract Documents, Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of: (1) any area and buildings adjacent to the site or the Work or (2) the Building in the event of partial occupancy.

§3.13.4 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 Owner. Without limitation of any other provisions 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 and patching shall be restored to the condition existing prior to the cutting, fitting and 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 such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or 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 Owner shall be entitled to reimbursement from the Contractor.

§ 3.15.3 Prior to the Architect's inspection for Submittal 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.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect 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 such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such 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 Owner, the Commissioners Court of Owner, all elected officials, employees and agents of Owner of any of the above mentioned parties (the "INDEMNIFIED PARTIES") from and against any and all loss, cost, expense, damage, injury, liability, claim, demand, penalty, or cause of action (including attorneys' fees), directly or indirectly arising out of, resulting from, or related to (in whole or in part), (1) the Work performed hereunder, (2) the Contract, or (3) the act or omission of Contractor, a Subcontractor, or an individual, partnership, joint venture, or corporation (a) directly or indirectly employed by Contractor or a Subcontractor, or (b) for whose acts or omissions Contractor or a Subcontractor may be liable (excluding property damage to the Work itself, covered by Owner's all-risk builder's risk insurance, subject to Contractor's liability for any deductible amounts thereunder). The obligations of

Contractor under this indemnification shall apply to all matters except those arising solely from the wanton and willful negligence or the malicious acts or omissions of Owner. Further, the obligations of Contractor under this indemnification shall not extend to the liability of Architect, its agents, or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications, (2) the giving of or failure to give directions or instructions by Architect, its agents, or employees, provided such giving or failure to give is the primary cause of the injury or damage, or (3) any matter prohibited by Section 130.002, Texas Civil Practice and Remedies Code. Contractor shall promptly advise Owner in writing of any action, administrative or legal proceeding, or investigation as to which this indemnification may apply, and Contractor, at Contractor's expense, shall assume on behalf of Owner and conduct with due diligence and in good faith the defense thereof with counsel satisfactory to Owner; provided, Owner shall have the right to be represented therein by advisory counsel of its own selection and at its own expense; and provided further, that if the defendants in any such action include both Contractor and Owner and Owner shall have reasonably concluded that they may be legal defenses available to it that are different from, or additional to, or inconsistent with, those available to it that are different from, or additional to, or inconsistent with, those available to Contractor. Owner shall have the right to select separate counsel to participate in the defense of such action on its own behalf at Contractor's expense. In the event of failure by Contractor to fully perform in accordance with this indemnification paragraph. Owner, at its option, and without relieving Contractor of its obligations hereunder, may so perform, but all costs and expenses so incurred by Owner in that event shall be reimbursed by Contractor to Owner, together with interest on the same from the date any such expense was paid by Owner until reimbursed by Contractor, at the rate of interest provided to be paid on judgments, by the law of the jurisdiction to which the interpretation of the Contract is subject. The obligations of Contractor under this Section shall survive the expiration of the Contract and specifically shall survive the limitations contained in Subparagraph 15.1 hereof.

§ 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.

§ 3.19 SUBSTITUTIONS OF PRODUCTS AND SYSTEMS, "OR EQUAL" BRANDS

§ 3.19.1 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 it meet 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.

§ 3.19.2 If, after award of contract, the Contractor or one of his Subcontractors or Suppliers determines that any of the products or systems specified will perform in a manner that will limit the Contractor's ability to satisfactorily perform the work or to honor the Warranty, the Contractor shall promptly notify the Architect, in writing, providing detailed substantiation for his position. Any changes deemed necessary by the Owner and Architect, including substitution of materials and change in Contract Sum, either upward or downward, if any, shall be accompanied by appropriate modification.

§ 3.20 RECORD DRAWINGS

§ 3.20.1 At the completion of the project, the Contractor shall submit one complete set of blue lines showing all changes and routing of utilities made during construction, excluding Architect made CAD changes, to the Architect. Drafting shall be legible to the Architect's satisfaction. The Contractor shall pay for the cost of the required recording/drafting. The record set shall be kept up to date on a daily basis and the Architect shall review its status at the project meetings. The Architect shall furnish the Contractor with a blueline set at contract award which shall have all Addenda incorporated. The Owner will pay for the printing of the blueline set. The Architect will incorporate any record information into the construction (CAD) documents and provide the Owner with an electronic copy of the record information on the Construction documents that have all bid and construction changes incorporated. The cost for incorporating the record information into the CD will be paid for by the Owner. The Architect will transmit the electronic CD to the Owner with a copy of the transmittal to the Contractor's construction manager.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 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.

§ 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 If the employment of the Architect is terminated, the Owner shall employ a successor architect whose status under the Contract Documents shall be that of the former Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 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 authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The 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 progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the 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. 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, 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.

§ 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 report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. Architect shall not have control over or charge of and shall not be responsible for safety precautions and programs in connection with the Work. Architect shall be responsible for promptly notifying Contractor of the failure of Contractor, Subcontractors or any other persons performing any of the Work, in failing to use proper construction means, methods, techniques, sequences, procedures, safety precautions and programs, but only to the extent Architect becomes aware of, or should, exercising due professional diligence, be aware of, same. Architect shall also promptly notify Owner in writing of the failure of any of the foregoing parties to carry out the Work in accordance with the Contract Documents.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 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 has authority and responsibility to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the

Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve or reject, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, 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, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize 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.

§ 4.2.9 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 duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 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, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 **DELETED.**

§ 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 or to otherwise furnish labor, material, or other services with respect to a portion of the Work. 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 subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site or to otherwise furnish labor, material, or other services with respect to a

portion of the Work. 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 or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, but no later than 10 days prior to the submittal date for the Contractor's first Application for Payment, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection. Failure of the Contractor to submit the subject names in a timely manner may delay processing of the Contractor's Application for Payment.

§ 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.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 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, which the Contractor, by these 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.

§ 5.3.1 All subcontracts shall be in written form and shall specifically provide that Owner is an intended third-party beneficiary of the subcontract.

§ 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 in writing; 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.

§ 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 such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

§ 5.5 Contractor shall promptly notify Owner and Architect of any material defaults by any Sub-contractor. Notwithstanding any provision contained in Article 5 to the contrary, it is hereby acknowledged and agreed that Owner has in no way agreed, expressly or implicitly, nor will Owner agree, to allow any Sub-contractor or other materialman or workman employed by Contractor the right to obtain a personal judgment or to create a lien against Owner for the amount due from the Contractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 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.

§ 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 other separate contractors and the Owner in reviewing their construction schedules. 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 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, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL 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 report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report 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, except as to defects not then reasonably discoverable.

§ 6.2.3 DELETED.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor causes to completed or partially completed construction or to property of the Owner or separate contractors 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.

§ 7.1.2 A Change Order shall be only based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect and is subject to the approval of Owner.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work. Except as permitted in Paragraph 7.3 and 9.7, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 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 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited, to all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

§ 7.2.3 Contractor shall keep and periodically submit to Owner copies of a log for all Change Orders.

§ 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. Contractor shall keep and periodically submit to Owner copies of a log for all Construction Change Directives and a log for all requests for information.

§ 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 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;
- .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 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 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.

§ 7.3.6 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.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and 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 not to exceed a total maximum of **fifteen percent (15%)** for all Work, and further limited to as follows, not to exceed five percent (5%) for Work done by Contractor's employees and **ten percent (10%)** of such Work's actual cost to be apportioned between any and all Subcontractors and Sub-subcontractor. "Actual cost" does not include any item that could be deemed to be a general conditions cost or overhead, such as, but not limited to, the cost of Contractor and Subcontractor supervisory personnel assigned to the Work, and field office and related expenses. 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 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority after having obtained Owner's approval to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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.

§ 8.1.1.1 The Work shall be fully completed within the time limit and/or date stated in the Contract between Owner and Contractor.

§ 8.1.1.2 **Liquidated Damages:** If the Contractor should fail to fully complete the Work within the stated time (subject however to extension of time duly granted in the manner and for the causes specified in the General Conditions), Contractor shall be charged by and shall pay to Owner, as liquidated damages, the sum specified in Article 3.1 of the Modified AIA document A101 – 2007 Edition per calendar day that the Work remains incomplete beyond the time fixed for completion. Contractor hereby agrees that from the nature of the project it would be impracticable and extremely difficult to fix the actual damage that would or will be suffered in the event that Contractor should fail to fully complete the Work by the time limit or date stated and the amount of the liquidated damages are fair and reasonable. The parties agree that the liquidated damages are a reasonable forecast of just compensation for the harm done to Owner that would be caused by Contractor's failure to timely complete the Work. Contractor agrees that the amount of liquidated damages due Owner may be deducted by Owner from any monies that might otherwise be or become payable to Contractor.

§ 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.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement 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, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 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 causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation, provided, however, that such extension of Contract time shall be net of any delays caused by or due to the fault or negligence of Contractor or that are otherwise the responsibility of Contractor and shall also be net of any contingency or "float" time allowance included in Contractor's construction schedule. Contractor shall, in the event of any occurrence likely to cause a delay, cooperate in good faith with Architect and Owner to minimize and mitigate the impact of any such occurrence and do all things reasonable under the circumstances to achieve this goal; or by other causes that 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.

§ 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. Contractor shall not be entitled to damages of any type for delays caused by Owner, his servant, agents, employees, or separate Contractors hired or retained by Owner. Contractor may receive an extension or extensions for additional time in which to complete the Contract but shall not receive any damages of

any type for such delays. Changes in the Work, regardless of the extent or number of such Changes or Owner's exercise of any of its remedies of suspension of the Work or requirement of correction or re-execution of any defective Work, shall not under any circumstances be construed as intentional interference with Contractor's performance of the Work.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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 Commitment of Current Revenues Only. As reflected in paragraph 4.5 of the modified AIA document A 101 – 2007 Edition by and between Owner and Contractor dated of even date herewith, in the event that, during any term hereof, the governing body of any party does not appropriate sufficient funds to meet the obligations of such party under this Contract, then any party may terminate this Contract upon ninety (90) days written notice to the other party. Each of the parties hereto agrees, however, to use its best efforts to secure funds necessary for the continued performance of this Agreement. The parties intend this provision to be a continuing right to terminate this Agreement at the expiration of each budget period of each party hereto pursuant to the provisions of Tex. Loc. Govt. Code Ann. '271.903.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Owner and to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work which in the aggregate equals the total Contract Sum, divided so as to facilitate payments to Subcontractors, supported by such evidence of correctness as Architect may direct or as required by Owner. This schedule, when approved by Architect and Owner, shall be used to monitor the progress of the Work and as a basis for Certificates for Payment. All items with entered values will be transferred by Contractor to the "Application and Certificate for Payment," and shall include the latest approved Change Orders and Construction Change Directives. Change Order values and Construction Change Directives values shall be broken down to show the various subcontracts. The Application for Payment shall be on a form as provided by Architect and approved by Owner. Each item shall show its total scheduled value, value of previous applications, value of the application, percentage completed, value completed, and value yet to be completed. All blanks and columns must be filled in, including every percentage complete figure. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 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, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents. Any allowances included in the Application for Payment shall be separately itemized with supporting data attached. The Application for Payment shall be accompanied by a certification by an office of Contractor to the effect that:

There are no known mechanics', materialman's or laborers' liens or claims, or any other liens or claims, legal or equitable, contractual, statutory, or constitutional, outstanding or known to exist at the date of this Application; all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current Application and there is no known basis for the filing of any mechanics', materialman's or laborers' lien or claim, or any other lien or claim, legal or equitable, contractual, statutory, or constitutional, on the Work; and waivers and releases from all Subcontractors, laborers, and material men for Work done and materials furnished have been obtained in such form as to constitute an effective waiver and release of all such liens and claims under the laws of the state within which the Project is located and shall be delivered to Architect together with Contractor's waiver and release of liens and claims at the time of submission of the Application for Payment.

§ 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 that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing by the Owner and Surety. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payments, deposits, or other advance payments for materials or equipment.

§ 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, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work. The vesting of such title shall not impose any obligations on Owner or relieve Contractor of any of its obligations under the Contract, that Contractor shall remain responsible for damage to or loss of the Work, whether completed or under construction, until responsibility for the Work has been accepted by Owner in the manner set forth in the Contract Documents.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and on all other information available to Architect including, without limitation, the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that 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, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified and that the aggregate amount theretofore paid to Contractor plus any applicable retention does not exceed the value of the completed portion of the Work. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, or (3) 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 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 opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, or that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 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 material or equipment suppliers 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 Architect will reflect such payment on the next Certificate for Payment.

§ 9.5.4 Notwithstanding any provision contained within this Article, if the Work has not attained Substantial Completion within the contract time, subject to extensions of time allowed under these Conditions, Architect may withhold any further payment to Contractor to the extent necessary to preserve 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 that Substantial Completion will be achieved.

§ 9.6 PROGRESS PAYMENTS

§ 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. Owner may refuse to make payment on any Certificate for Payment for any default of the Contract, including, but not limited to, those defaults set forth in Clauses 9.5.1.1 through 9.5.1.7. Owner shall not be deemed in default by reason of withholding payment while any of such defaults remain uncured.

§ 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. 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 material and equipment 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 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. .

§ 9.6.5 Contractor payments to material and equipment 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 DELETED.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not, for reasons other than a default of the Contract, including, but not limited to, those defaults set forth in Clauses 9.5.1.1 through 9.5.1.7 pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect, then the Contractor may, upon seven additional days' written 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 shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.7.1 If Owner is entitled to reimbursement or payment from Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if Contractor fails to promptly make any payment due Owner, or if Owner incurs any costs and expenses to cure any default of Contractor or to correct defective Work, Owner shall have an absolute right to offset such amount against the Contract Sum and may, in Owner's sole discretion, elect either to (i) deduct an amount equal to that which Owner is entitled from any payment then or thereafter due Contractor from Owner, or (ii) issue a written notice to Contractor reducing the Contract Sum by an amount equal to that which Owner is entitled.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof (which Owner agrees to accept separately) is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 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, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall 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 issuance of the certificate of final payment by Architect unless otherwise provided in the Certificate of Substantial Completion. The Work will not be considered suitable for Substantial Completion review until all Project systems included in the Work are operational as designed and scheduled, all designated or required governmental inspections and certifications have been made and posted, designated instruction of Owner's personnel in the operation of systems has been completed, and all final finishes within the Contract are in place. In general, the only remaining Work shall be minor in nature, so that Owner and/or Owner's employees and if applicable, the public, could occupy the building on that date and the completing of the Work by Contractor would not materially interfere or hamper Owner's or Owner's employees and if applicable, the public, (or those claiming by, through, or under Owner) from normal County operations. As a further condition of Substantial Completion acceptance, Contractor shall certify that all remaining Work will be completed within thirty (30) consecutive calendar days or as agreed upon following the Date of Substantial Completion. If Contractor requests a Substantial Completion review, and Architect, after performing the Substantial Completion review, finds that the Project was not ready for the Substantial Completion review, then Contractor shall pay the Architect's fees for any additional Substantial Completion reviews.

§ 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 such Certificate. Upon such acceptance and consent of surety, if

any, the Owner shall make payment of retainage applying to such 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 have 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.

§9.8.7 After the date of Substantial Completion of the Project, as evidenced by the Certificate of Substantial Completion, 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 this report, the Contractor and surety will be informed that, should correction remain incomplete for fifteen (15) days, the Owner may initiate action to complete corrective work out of the remaining Contract funds in accordance with Article 14.

§ 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 as required under Section 11.3.1.5 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 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 and, when the Architect 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 on the basis of the Architect'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 found to be due the Contractor and noted in the final Certificate is due and payable. The Architect'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 and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the

Contractor knows of no substantial 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 and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, 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. If such lien 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 such lien, including all costs and reasonable attorneys' fees.

§ 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 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 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.

§ 9.10.4 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 faulty or defective Work appearing after Substantial Completion.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material 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.

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.

§ 10.2 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 or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the project and improvements therein. Any damage to such property or improvements shall be promptly repaired by the Contractor.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The 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.

§ 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, written notice of such 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.

§ 10.3 HAZARDOUS MATERIALS

§ 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, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such 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 in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 DELETED.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance 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 DELETED.

§ 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 LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor and Owner from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.1.5 SCHEDULE OF INSURANCE COVERAGES

§ 11.1.5.1 Contractor shall carry and keep in full force for the duration of the project the following Coverage.

Coverage	Minimum Amounts and Limits

Worker's Compensation	Statutory Limits
Employer's Liability:	
Bodily Injury by Accident	\$500,000.00/each accident
Bodily Injury by Disease	\$500,000.00/each employee
Bodily Injury by Disease	\$500,000.00/Policy Limit

Commercial General Liability

Bodily Injury/Property Damage	\$1,000,000.00 per occurrence \$2,000,000.00 aggregate

(Premises Operations, Independent Contractors, Product/Completed Operations, Personal Injury, Contractual Liability, Explosion, Collapse, Underground and Broad Form Property Damage).

Comprehensive Automobile Liability	\$1,000,000.00 Combined Single Limit per Occurrence

Auto liability insurance shall be on a standard form written to cover all owned, hired, and non-owned automobiles. The policy shall be endorsed to include the Indemnified Parties (paragraph 3.18) as additional insured, contain cross-liability and severability of interest endorsements, and state that this insurance is primary insurance as regards to any other insurance carried by the Indemnified Parties (see paragraph 3.18).

§11.1.5.2 All policies shall contain special endorsements to include:

- .1 The Owner as an additional insured (except for Worker's Compensation) and all other parties identified in 3.18 (Indemnified Parties);
- .2 Waiver of Subrogation in favor of Owner under the Worker's Compensation and Employer's Liability policies.
- .3 A statement that a notice shall be given to Owner by certified mail thirty (30) days prior to cancellation or upon any material changes in coverage.
4. Contain cross-liability and severability of interest endorsements;
5. state that this insurance is primary insurance in regard to any other insurance carried by the an Indemnified Party (see 3.18);
- .6 the following coverage:
 - a. Premises/Operations;
 - b. Independent Contractors;
 - c. Completed Operations for a period of two years following the acceptance of Contractor's Work;
 - d. Comprehensive General Liability Endorsement to include Blanket Contractual Liability (specifically covering, but not limited to, the contractual obligations assumed by Contractor, Broad Form Property Damage, and Personal Injury Liability with employee and contractual exclusions removed;
 - e. Deletion of exclusions relative to Collapse, Explosion, and Underground Property Damage Hazards;
 - f. Personal Injury Liability with the contractual exclusions removed;
 - g. Cross Liability Endorsement.

§11.1.5.6 Umbrella Excess Liability Insurance

Bodily Injury and Property Damage	\$2,000,000.00 per occurrence \$2,000,000.00 aggregate

This policy shall be written on an umbrella excess basis above, the coverage described in this Article 11.

The policy shall be endorsed to include the Indemnified Parties (3.18) as additional insureds. The policy shall contain cross-liability and severability of interest endorsements and shall state, as regard the Indemnified Parties that the insurance is primary insurance as to any other insurance carried by any Indemnified Party. The policy shall be endorsed to provide the defense coverage obligation.

§11.1.6 Further, Contractor shall require all Subcontractors to carry similar insurance coverage and limits of liability as required under this Article 11, adjusted to the nature of Subcontractor's operations and submit same to Owner for approval before any Work commences.

§11.1.7 In the event Contractor fails to obtain the required certificates of insurance from the Subcontractor and a claim is made or suffered, Contractor shall indemnify, defend, and hold harmless the indemnified parties from any and all claims for which the required insurance would have provided coverage.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.2.1 By signing the Contract or providing or causing to be provided a Certificate of Coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services on the Project will be covered by workers' compensation coverage for the duration of the Project, that coverage will be based on proper reporting or classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

§11.2.2 Optionally, the Owner may require the Contractor to purchase and maintain Project Management Protective Liability insurance from the Contractor's usual sources as primary coverage for the Owner's, Contractor's and Architect's vicarious liability for construction operations under the contract. Unless otherwise required by the Contract Documents, the Owner shall reimburse the Contractor by increasing the Contract Sum to pay the cost of purchasing and maintaining such optional insurance coverage and the Contractor shall not be responsible for purchasing any other liability insurance on behalf of the Owner. The minimum limits of liability purchased with such coverage shall be equal to the aggregate of the limits required for Contractor's Liability Insurance under Article 11.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Contractor shall obtain a builder's risk "all-risk" or equivalent policy in the amount of the initial Contract Sum (or, if applicable Guaranteed Maximum Price), plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. The policy must also name its subcontractors and the Owner as additional insured, as their respective interests may appear. Coverage shall include material stored on-site and in transit. Such insurance will be with a company or companies lawfully authorized to do business in Texas. The policy must have the following endorsement: "This insurance shall be specific as to coverage and not considered as contributing insurance with any permanent insurance maintained on the present premises."

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.1.1 For any claim made against Contractor's Builder's Risk Insurance, the deductible shall not exceed \$2,500.00 for a Contract Sum of less than \$4 million. For a Contract Sum of \$4 million or more, the deductible shall not exceed \$5,000.00.

§11.3.1.1.2 The Contractor waives all rights against (1) Owner, the Subcontractors, Sub-subcontractors, agents, and employees, and (2) the Architect, Architect's consultants, separate contractors, if any, and any of their Subcontractors, Sub-subcontractors, agents, and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this paragraph or other property insurance applicable to the

Work, except such rights as Contractor has to proceeds of such insurance held by the Contractor as a fiduciary. The Contractor, as appropriate, shall require of any separate contractors, Subcontractors, Sub-subcontractors, agents, and employees of any of them by appropriate written agreements, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§11.3.1.1.3 The Contractor as fiduciary shall have power to adjust and settle a loss with insurers. The Contractor shall pay all Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements shall require Subcontractors to make payment to their Sub-subcontractors in similar manner. If required in writing by a party in interest, the Contractor as fiduciary shall, upon occurrence of insured loss, give bond for proper performance of the Contractor's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Contractor shall deposit in a separate account proceeds so received, which the Contractor shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor under the insurance proceeds.

§ 11.3.1.2 DELETED.

§ 11.3.1.3 DELETED.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use shall not affect the validity or coverage of property insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE
DELETED.

§ 11.3.3 LOSS OF USE INSURANCE
DELETED.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 DELETED.

§ 11.3.6 DELETED.

§ 11.3.7 WAIVERS OF SUBROGATION

The Contractor waives all rights against (1) Owner, the Subcontractors, Sub-subcontractors, agents, and employees, and (2) the Architect, Architect's consultants, separate contractors, if any, and any of their Subcontractors, Sub-subcontractors, agents, and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to Article 11 or other property insurance applicable to the Work, except such rights as Contractor has to proceeds of such insurance held by the Contractor as a fiduciary. The Contractor, as appropriate, shall require of any separate contractors, Subcontractors, Sub-subcontractors, agents, and employees of any of them by appropriate written agreements, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of

insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 DELETED.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Contractor shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract Sum, as security for the faithful performance of the Contract and also a one hundred percent (100%) Payment Bond, as security for the payment of all persons performing labor on the Project under this Contract and furnishing materials in connection with the Contract. The Performance Bond and the Payment Bond may be in one or in separate instruments in accordance with local law. Surety companies must be authorized to write surety bonds in Texas and any such surety bond must comply with the requirements of Subchapter A of Chapter 3503 of the Texas Insurance Code

§11.4.1.1 The Contractor shall deliver the required Bonds to the Owner not later than the date of the preconstruction meeting. All Bonds will be reviewed by the Architect for compliance with the Contract Documents prior to the execution of the Contract. In the event that Architect has any questions concerning the sufficiency of the bonds, Architect shall refer the bonds to Owner or Owner's representative for decision.

§11.4.1.2 All bonds shall be originals. The Contractor shall require the attorney-in-fact who executes the required Bonds on behalf of the Surety to affix thereto a certified and current copy of the power-of-attorney. The name, address, and telephone number of a contact person for the Bonding Company shall be provided.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.4.3 The Bonds shall be provided to comply with the terms and provisions of Chapter 2253 of the Texas Government Code. Bonds shall be signed by an agent resident in the State of Texas and date of bond shall be on or after the date of execution of the Contract but prior to the date of the notice to proceed. If at any time during the continuance of the Contract, the surety of the Contractor's bonds becomes insufficient, the Owner shall have the right to require additional and sufficient sureties which the Contractor shall furnish to the satisfaction of the Owner within ten (10) days after notice to do so. In default thereof, the Contractor may be suspended, and all payment or money due to the Contractor withheld until sufficient bonds are provided by Contractor.

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 or Contract Sum.

§ 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, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect as incomplete, defective, or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the entire Work (unless otherwise provided in any Certificate of Partial Substantial Completion approved by the parties), or within such longer period of time as may be prescribed by law or in equity, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be defective or otherwise not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This corrective period shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. Corrective Work shall be warranted to be free from defects for a period equal to the longer of six (6) months after the completion of the corrective Work or one (1) year after the Date of Substantial Completion (subject to extension as previously described) or such longer period of time as may be prescribed by law or in equity, or expiration of the term of any applicable special warranty, if applicable, required by the Contract Documents. Any defect in such Work shall be corrected again by Contractor promptly upon notice of the defect from Owner. This obligation under this Subparagraph 12.2.2.1 shall survive acceptance of the Work under the Contract and termination of the Contract by the Owner. 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 2.4.

§ 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.

§ 12.2.2.4 Just before the termination of the various guarantee periods, Contractor shall accompany Owner's agent and Architect on an inspection tour of the building and shall note any defects and shall start remedying these defects within ten (10) days of the inspection tour and shall prosecute the Work without interruption until accepted by Owner and Architect, even though such prosecution should extend beyond the limit of the guarantee period.

§ 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, whether completed or partially completed, of the Owner or separate contractors caused in whole or in part by the Contractor's correction or removal of Work that is defective or otherwise 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 or under law or in equity. Establishment of the 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

If the Owner prefers to accept Work that is defective or otherwise not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located.

§ 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 such 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 such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice or if delivered by facsimile to the offices of the person or corporation for which it was intended. Facsimiles 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.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 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 or in equity or by any other agreement, and any such rights and remedies shall survive the acceptance of the Work and/or any termination of the Contract Documents.

§ 13.4.2 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 there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 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. Architect, Owner and Contractor shall be afforded a reasonable opportunity to attend, observe, and witness all inspections and tests of the Work. Architect or Owner may at any time request and receive from Contractor satisfactory evidence that materials, supplies, or equipment are in conformance with the Contract Documents. The conduct of any inspection or test and the receipt of any approval shall not operate to relieve Contractor from its obligations under the Contract Documents unless specifically so stated by Owner in writing.

§ 13.5.2 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 13.5.1, 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.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, or reveal faulty or otherwise defective Work, or if the necessity of any such testing, inspection, or approval procedures arises out of the fault, neglect, or omission of Contractor, Contractor shall bear all costs of such testing, inspection, and approval procedures and all other costs made necessary by Contractor's failures, including, without limitation, those costs of repeated and additional procedures and compensation for Architect's services and expenses of Owner's personnel and consultant fees and expenses. Such costs shall be paid by Contractor within ten (10) days of receipt of invoice from Owner with supporting data attached.

§ 13.5.4 Required certificates of testing, inspection or approval shall, be secured by the Contractor and delivered to Owner, unless such testing or inspection services are arranged by Owner.

§ 13.5.5 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.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

An overdue payment bears interest at the rate of zero percent (0%) each month, or at the legal rate established by the Texas Government Code, currently in Section 2251.025. Any such payment shall be deemed overdue on the thirty-first (31st) day after Owner receives an invoice from Contractor.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract within the time period specified by applicable law.

§ 13.8 EQUAL OPPORTUNITY

§ 13.8.1 The Contractor shall maintain policies of employment as follows: "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. Contractor shall take affirmative action to ensure 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, promotion, demotion, or transfer; recruitment, or recruitment advertising; lay-off 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, notices setting forth the nondiscrimination policies."

§13.8.1.1 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf; state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, or national origin.

§13.9 CERTIFICATION OF ASBESTOS-FREE PROJECT

§13.9.1 Contractor shall submit to the Architect a letter addressed to the Owner certifying that all materials used in the construction of this Project contain less than 0.10 by weight of asbestos and for which it can be demonstrated that, under reasonably foreseeable job site conditions, will not release asbestos fibers in excess of 0.1 fibers per cubic centimeter. Certification letters shall be dated, shall reference this specific Project, and shall be signed by not less than two (2) officers of the construction company.

§13.9.2 Certification shall further state that should asbestos fibers be found at this Project in concentrations greater than 0.1 fibers per cubic centimeter, that Contractor shall be responsible for determining which materials contain asbestos fibers and shall take corrective action to remove those materials from the Project at no additional cost to the Owner.

§13.9.3 Final payment shall not be made until this letter of certification has been received.

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 or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .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;

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work properly executed in accordance with the Contract Documents.

§ 14.1.4 Owner shall not be responsible for damages for loss of anticipated profits on Work not performed on account of any termination described in Subparagraphs 14.1.1 and 14.1.2.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 refuses or fails to supply enough properly skilled workers or proper materials and equipment;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;
- .4 disregards the instructions of Architect or Owner (when such instructions are based on the requirements of the Contract Documents);
- .5 is adjudged bankrupt or insolvent, or makes a general assignment for the benefit of Contractor's creditors, or a trustee or receiver is appointed for Contractor or for any of its property, or files a petition to take advantage of any debtor's act, or to reorganize under bankruptcy or similar law; or
- .6 otherwise does not fully comply with the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and 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 To the extent the costs of completing Work, including compensation for additional professional services and expenses, exceed those costs that would have been payable to Contractor to complete the Work except for Contractor's default, Contractor will pay the difference to Owner, and this obligation for payment shall survive termination of the Contract. Such costs incurred by Owner will be determined by Owner and confirmed by Architect.

§ 14.2.5 In addition to Owner's right to remove Contractor from any part of Work pursuant to the Contract Documents, Owner may, at any time, at will and without cause, terminate any part of Work or any subcontract or all remaining Work for any reason whatsoever by giving seven (7) days' prior written notice to Contractor specifying the part of Work or subcontract to be terminated and the effective date of termination. Contractor shall continue to prosecute the part of Work not terminated. If any part of Work or subcontract is so terminated, Contractor shall be entitled to payment for Work properly executed in accordance with the Contract Documents (the basis for such payment shall be as provided in the Contract) and for costs directly related to Work thereafter performed by Contractor in terminating such Work or subcontract including reasonable demobilization and cancellation charges provided said Work is authorized in advance by Architect and Owner. No payment shall be made by Owner, however, to the extent that such Work or subcontract is, was, or could have been terminated under the Contract Documents or an equitable adjustment is made or denied under another provision of the Contract. In case of such termination, Owner will issue a Construction Change Directive or authorize a Change Order making any required

adjustment to the Date of Substantial Completion and/or the Contract Sum. For the remainder of the Work, the Contract Documents shall remain in full force and effect.

§14.2.6 Owner shall not be responsible for damages for loss of anticipated profits on Work not performed on account of any termination described in Subparagraph 14.2.5.

§14.2.7 Upon a determination by a court of competent jurisdiction that termination of Contractor pursuant to Subparagraph 14.2.1 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Subparagraph 14.2.5 and Contractor's remedy for wrongful termination shall be limited to the recovery of the payments permitted for termination for convenience as set forth in Subparagraph 14.2.5

§ 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 as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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 adjustment or interpretation of the Contract Terms, payment of money, extension of 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. Claims must be by written notice.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written 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 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Said written notice of claims shall state specifically the reason for the claim, the date or dates of the cause or causes of the claim, and if any extension of time is requested, the number of days of extension requested.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

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. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Said notice shall itemize all claims and shall contain sufficient detail and substantiating data to permit evaluation of same by Owner and Architect. No such claim shall be of value unless so made. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 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. Extensions of time may be requested for any month of construction for days lost due to adverse weather in excess of the normally expected lost time; provided, however, if Architect determines that the seasonal average of adverse weather days during construction is less than would be normally expected, no Change Order shall be issued and the request for extension of time shall be denied.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

Contractor shall not be entitled to claims for additional time and/or increase in Contract Price due to a problem or non-performance of a subcontractor.

§ 15.1.7 In the event the Contractor fails to achieve substantial completion by the date indicated in the Contract, and extended by approved Change Order, the Owner shall be entitled to liquidated damages in the amount as stated in Subparagraph 3.1.1 of the modified AIA document A 101 – 2007 Edition by and between Owner and Contractor dated of even date herewith per day until the Work is substantially completed. It is expressly understood that the said sum per day is agreed upon as a fair estimate of the pecuniary damages, which will be sustained by Owner in the event that the Work is not completed within the agreed time, or within the legally extended time, if any. Said sum shall be considered as liquidated damages only, the exact ascertainment of which is difficult and in no sense be considered a penalty.

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 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, 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 arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The 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 in whole or in part, (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 such 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 therefor; 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 litigation.

§ 15.2.6 DELETED.

§ 15.2.6.1 DELETED.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 DELETED.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract shall be subject to mediation as a condition precedent to litigation.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation. 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.

§ 15.3.3 The parties shall share the mediator's fee. 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

The parties expressly agree that disputes or claims arising under the Contract Documents shall not be subject to arbitration unless mutually agreed by the parties in writing.

§ 15.4.1 DELETED..

§ 15.4.1.1 DELETED.

§ 15.4.2 DELETED.

§ 15.4.3 DELETED.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 DELETED.

§ 15.4.4.2 DELETED.

§ 15.4.4.3 DELETED.

SECTION 00100

INSTRUCTIONS TO BIDDERS

Project: 2014-067-04-02-MSS Hidalgo County Pct. 4 – Construction of Linn-San Manuel Emergency Services Facility

Architects: Mata-Garcia Architects LLP
1314 Ivy Avenue
McAllen, Texas 78501
Tel: 956.631.1945 Fax: 956.631.1968

1. Receipt and Opening of Bids:

The Owner invites bids on the form indicated in Section 00300 for the referenced projects. (Copies of this form may be made for bidding purposes.)

The Owner may consider informal any bid not prepared and submitted in accordance with provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the scheduled time or the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within Ninety (90) days after the actual date of the opening thereof.

2. Preparation of Bid:

Each bid must be submitted on the prescribed form or a copy thereof. All blank spaces for bid prices must be filled in, in ink or type written, in both words and figures. Bid forms may be copied, do not use sample forms bound in the specifications. Each bid must be submitted in a sealed envelope addressed to the Owner and designated "Proposal" bearing on the outside the name of the proposer, his address, the name of the project for which the proposal is submitted and the date and hour of the opening. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to the owner at the designated location for the opening of bids. (Refer to Request for Bids page provided by Hidalgo County Purchasing Department.)

3. Method of Bidding:

The Owner invites the following bid(s):

BASE BID: All work for the building & all related work as indicated by the Contract Documents.

4. Qualifications of Bidder:

The Owner may make such investigations as he deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the owner all such information and data for this purpose as the Owner may request. The owner reserves the right to reject a bid if the evidence submitted by, or investigation of such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

5. Liquidated Damages for Failure to Enter into Contract:

The successful bidder, upon his failure or refusal to execute and deliver the contract, insurance and bonds required within 10 days after he has received notice of the acceptance of his bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with his bid.

6. Time of Completion:

Time of completion of the contract is of importance to the Owner and may be considered in the award of the contract. Payments on the Contract will be made as provided by the Contractor. No payments will be made on the Contract after 30 days prior to the completion date set by the Contractor, until final completion and acceptance by the Architect and Owner. The Contractor shall include in his bid proposal a time to complete the base proposal (stated in calendar days) that includes his best anticipation of the number of working days that construction may be unable to take place due to the inclement weather and muddy ground. This anticipated number of lost working days shall be included on the bid proposal form in the space designated for the total number of calendar days required to complete the base proposal. Extensions to the Completion Date will be granted only if, in the opinion of the Architect, climatology conditions that impede the progress of construction significantly exceed average conditions will be the bulletin "Local Climatology Data", published by the Department of Commerce.

7. Conditions of Work:

Each bidder must inform himself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve the successful bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his contract.

8. Addenda and Interpretations:

No interpretations of the meaning of the plans, specifications or other pre-bid documents will be to any bidder orally. Every request for such interpretations should be in writing addressed to the Architect, and to be given consideration must be received at least five days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instruction will be mailed to all prospective bidders no later than three days prior to the date fixed for the openings of bids. All addenda so issued shall become part of the contract documents.

9. Laws and Regulations:

The bidder's attention is directed to the fact that all applicable Federal Laws, State Laws, Municipal Ordinance, and the rules and regulations of all authorities have jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the Contract the same as though herein written out in full.

10. Obligation of Bidder:

At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve the bidder from any obligation in aspect of this bid.

11. Failure of Timely Order:

The contractor is responsible for assuring the timely order of all materials specified. If a specified material, or color of material cannot be delivered by the contractor completion date, due to failure to order the material in a timely manner, the contractor will be responsible for supplying and equal or better material. The architect will be the sole determinant of the approved substitute material. The contractor will also be charged an amount equal or 5% of the value of the specified material. This amount will be credited to the owner through a change order to the contract. The word "material", used in this section, includes all terms specified in the specifications or shown on the drawings.

12. Sub-Bid Time Limits:

So that Contractors may have adequate opportunity to evaluate sub-bids, it is recommended that the "Time Limit Plan" be honored; sub and material bid must have been submitted to Contractors four (4) hours prior to the time set for bid opening.

13. Contractor's Limitation of Liability:

The bidder affirms that he and his sub-contractors are skilled and experienced in the use and interpretation of plans, specifications, addenda and related bid documents and, that he has carefully reviewed the plans, specifications, addenda and related bid documents for this project and has found them to be free of conflicts and/or ambiguities and sufficient for bidding and construction purposes. Further, he has carefully examined the soil reports and the site of the work, through his own rewrite the difficulties likely to encounter; the other items and/or conditions which may affect the satisfactory performance of the work. He has based his bid solely in these documents-and personal observations-and has not relied in any way on any explanation or interpretation-oral or written-form any source other than those written and issued by the Architect/Engineer.

14. Liquidated Damages on Contract for Construction:

Liquidated damages, in the amount of \$500.00 per calendar day, will be assessed for each day the general contractor exceeds the contract days for construction set by the general contractor in his bid or the contract days for construction set in the contract with the County of Hidalgo.

15. Pre-Proposal Conference:

A Pre-Bid Conference will be held prior to the bid date. (Monday, March 24, 2014 at 3:00pm, at Hidalgo County Purchasing Department Conference Room, 2812 South Business Highway, Edinburg, Texas 78539.) Attendance by representatives of the building contractors is highly desirable. Sub-Contractors who expect to be associated with the project are invited. Representative of the Architects, Engineers and Architect's Consultants will review the plans, specifications, details, materials, demolition, alterations and requirements of the work. Specific questions will be accepted, but not necessarily answered, at the conference. An addendum indicating any change in the Contract Documents will be issued, if necessary, subsequent to this meeting.

All information in this section is to be cross-referenced with the County Of Hidalgo front-end documents.

END OF SECTION

Section 00200

Information Available to Bidders

PART 1 GENERAL

1.01 INVESTIGATION

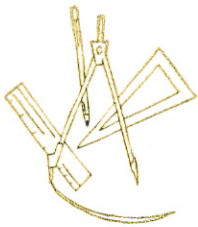
- A. Soil and sub-surface investigations were conducted at the site, the results of which are to be found in the report issued by L&G Engineering Laboratory, L.L.C., 2100 West Expressway 83, Mercedes, Texas 78570; Tel. 956.565.0760, Fax. 956.565.6746
- B. The information obtained is included herein for the convenience of the contractor.
- C. Bidders are urged to examine soils investigation data and to make their own investigation of the site before bidding.

1.02 INTERPRETATION

- A. Soil investigation data is provided only for information and the convenience of the bidders. The County of Hidalgo, Precinct No. 4 and the architect/engineers disclaim any responsibility for the accuracy, true location, and the extent of the Soils Investigation that has been prepared by others. They further claim no responsibility for interpretation of that data by bidders, as in projecting soil-bearing values, rock profiles, soil stability, and the presence, level and extent of underground water.
- B. Soil investigation data is not a part of the contract documents.

Logs of borings to follow.

End of Section



L&G Engineering Laboratory

Construction Material Testing
Geotechnical Engineering

**GEOTECHNICAL INVESTIGATION
FOR THE
EMERGENCY SERVICES FACILITY – SAN MANUEL PROJECT
HIDALGO COUNTY, TEXAS**

**Prepared For:
Hidalgo County Pct. No. 4**

**Prepared By:
L&G Engineering Laboratory, L.L.C.
Mercedes, Texas 78570
[Texas Registered Engineering Firm F-6633]**

**L&G Project No. GL13032
January 7, 2014**

**Reza Badiozzamani, P.E.
Project Engineer**



INTRODUCTION.....	1
GENERAL PROJECT OVERVIEW	1
Project Description	1
Scope and Limitations of Investigation.....	1
EXISTING SURFACE AND SUB-SURFACE CONDITIONS	2
Site Location / Description	2
Geology.....	2
Soil Survey Description	2
Rainfall.....	3
SITE INVESTIGATION.....	3
Soil Borings and Laboratory Tests.....	3
Subsurface Stratigraphy	4
Water Strikes.....	5
GEOTECHNICAL BORING ANALYSIS.....	5
Moisture Content	5
Plasticity Index.....	6
Particle Size Analysis (Determination of Fines Content)	6
FOUNDATION RECOMMENDATIONS	6
Proposed Project Foundation System Information	6
Bearing Capacity of Soils (Shallow Foundations).....	7
Bearing Capacity of Slab on Grade Foundation.....	8
Bearing Capacity of Shallow Square Footings.....	8
Bearing Capacity of Perimeter Footings (Grade Beams).....	8
Potential Vertical Rise (Slab on Grade).....	9
Post-Tensioning Institute (PTI) Slab Design Parameters	9
Wire Reinforcement Institute (WRI) Slab Design Parameters	10
GENERAL CONSTRUCTION CONSIDERATIONS	10
General Site Soils & Conditions Construction Recommendations	10
Site Grading Recommendations	11
Site Drainage Recommendations.....	11
Site Preparation Recommendations.....	11
Select Fill & Structural Fill Recommendations	11
Excavation, Sloping, Benching and Utility Considerations	13
PAVEMENT RECOMMENDATIONS.....	13
Background Information	13
Subgrade Analysis.....	13
Pavement Section Recommendations.....	14
Pavement Material Specification Recommendations	14
Asphaltic Concrete Pavement (ACP) Surface.....	14
Flexible Base Material (Crushed Limestone).....	14
Flexible Base Material (Caliche).....	14
Compacted Subgrade.....	15
General and Miscellaneous Recommendations.....	15
REFERENCES.....	16
APPENDIX A – FIGURES	A

APPENDIX B – BORING LOGS.....	B
APPENDIX C – POTENTIAL VERTICAL RISE.....	C
APPENDIX D – PLANS & SPECS (PROVIDED BY CLIENT).....	D

INTRODUCTION

L&G Engineering Laboratory, L.L.C. (L&G) was contracted by **Hidalgo County Precinct No 4. (HC Pct. 4)** to perform a subsurface geotechnical investigation for the proposed San Manuel, Texas - Emergency Services Facility. This report addresses several foundation recommendations, parameters for slab foundation design criteria based on the Post Tension Institute (3rd Edition) and Wire Reinforcement Institute specifications, as well as recommendations for maximum allowable bearing capacity of shallow foundations. Also included in this report are pavement recommendations, boring logs, and several figures addressing the potential vertical rise and existing geology of the proposed construction site.

GENERAL PROJECT OVERVIEW

Project Description

L&G is pleased to submit this document presenting our findings as the result of a subsurface geotechnical exploration performed at the request of **HC Pct. 4**. The project site is located within San Manuel, Texas, at the south-east intersection of US 281 and SH 186. It is our understanding that the project involves the construction of a concrete slab on grade (only illustrated on the layout - unknown size and details) and a parking lot area (typical flexible pavement). A preliminary general site plan sheet / project layout and minimal structure detail sheet for the proposed service facility was provided by the Client (**HC Pct. 4**) and are included in Appendix D. No grading plans or structural loads for the building/structures were provided; thus all foundation and site improvement recommendations as provided in this report are based on the geotechnical properties of the soils and generalized assumptions as noted.

Scope and Limitations of Investigation

This report has been prepared in general accordance with accepted geotechnical engineering practices for the subject project site and the anticipated construction. No specific warranty program or other special standards, except acceptable industry standards for the general South Texas area, were followed during the course of this investigation and analysis. This geotechnical report is intended for use by **HC Pct. 4**, and any direct representatives or affiliates. This geotechnical report may not contain sufficient information for purposes of other parties, or other uses in determining construction means and methods.

The strata, shown on the boring logs (included in Appendix B), represent the subsurface conditions at the boring locations at the time of our investigation. These strata designate approximate boundaries between subsurface materials; however, their actual transition may be gradual or may occur at varying depths. Variations may occur due to unexpected deposits of soft clays, silts or other undesirable soil material not detected through our investigation. It should be noted that the exploratory borings were performed within the limits of the proposed project as approved and agreed upon by all previously noted parties prior to the commencement of our field operations.

The benchmarks of this geotechnical study are to:

1. explore the general existing subsurface conditions at the site
2. evaluate the relevant engineering properties of the subsurface materials
3. provide the potential vertical rise and recommendations to minimize shrink/swell
4. provide the maximum allowable bearing capacity of in-situ soils for shallow foundations
5. provide design parameters for several foundation design methods including WRI and PTI
6. provide recommendations for foundation construction
7. provide recommendations for pavement thicknesses and materials

The scope of this geotechnical engineering study does not include an environmental assessment of the air, soil, rock or water conditions on or adjacent to the site. No environmental opinions are presented in this report. If environmental clearances are needed prior to construction, please contact our offices for assistance in this matter.

EXISTING SURFACE AND SUB-SURFACE CONDITIONS

Site Location / Description

The project site is located within the city limits of San Manuel, Texas, at the south-east corner of the intersection of US 281 and SH 186. The proposed emergency services facility is to be placed adjacent to the west side of an existing parking lot. Access to the facility from SH 186 is proposed to be provided by two paved roads with parking on the east and south sides of the building (as shown in the provided layout in Appendix D and on the figures in Appendix A). The boring locations were drilled as close as possible to the locations specified by the Client as shown on Figure 2 in Appendix A. No surveyor was contracted to determine the exact coordinates for the borings, as this was not a part of the scope of work for the project; however, field handheld GPS coordinates were retrieved and are noted on the boring logs in Appendix B. The property had minimal to medium vegetation at the time of drilling including short to medium grasses and light to medium brush.

Geology

The Geologic Atlas of Texas, McAllen-Brownsville Sheet, dated 1976, indicates that the subject site is located primarily within the *Goliad Formation* of the *Tertiary epoch (Pliocene period)* consisting of “clay, sand, sandstone, marl, caliche, limestone, and conglomerate; clay, commonly light shades of pink and green, calcareous concretions; sand and sandstone, medium to very coarse grained, in part crossbedded, mostly quartz, some black and red chert; conglomerate, black chert and dark siliceous granules and pebbles in calcareous (caliche) matrix; sandstone and conglomerate locally well bedded; marl and limestone poorly bedded or massive; Tertiary vertebrate and reworked Cretaceous invertebrate fossils fairly common; thickness up to 600 feet” (See Figure 5 in Appendix A for Geologic Atlas of Texas Map).

Soil Survey Description

According to the Soil Survey of Hidalgo County, Texas, published by the United States Department of Agriculture, the proposed site is located within the Hebbronville Sandy Loam (0

to 1 % slopes) soil map unit (#22) and the Delfina Loamy Fine Sand (0 to 3% slopes) soil map unit (#9) (see Figure 3 in [Appendix A](#) for USDA Soils Map).

Hebbronville Sandy Loam (0 to 1 % slopes) soil map unit (#22) is a deep, nearly level formation on convex uplands. The soil is well drained, with moderately rapid permeability. The available water capacity is moderate (about 7.9 inches), and the soil is classified as non-saline (0.0 to 2.0 mmhos/cm). The maximum content of calcium carbonate in the soil is 5 percent. The typical soil profile for this map unit consists of 0 to 17 inches: brown sandy loam, 17 to 39 inches: brown fine sandy loam, and 39 to 58 inches: yellowish brown fine sandy loam, 58 to 65 inches: light yellowish brown fine sandy loam. This soil classification is calcareous to 39 inches.

Delfina Loamy Fine Sand (0 to 3% slopes) soil map unit (#9) is a deep, gently sloping formation on convex uplands. The soil is moderately well drained, with moderately slow permeability. The available water capacity is medium (about 7.9 inches), and the soil is classified as non-saline to very slightly saline (0.0 to 4.0 mmhos/cm). The maximum content of calcium carbonate in the soil is 15 percent. The typical soil profile for this map unit consists of 0 to 16 inches: brown loamy fine sand, 16 to 25 inches: dark brown sandy clay loam with yellowish red and grayish brown mottles, 25 to 37 inches: brown sandy clay loam with yellowish red mottles, 37 to 49 inches: brown sandy clay loam with grayish brown mottles, and 49 to 72 inches: light brown sandy clay loam. This soil classification is non-calcareous to 49 inches.

Rainfall

The mean annual precipitation for this area of Hidalgo County is approximately 20-24 inches, as reported by the U.S. Department of Agriculture Soil Conservation Service. Our geotechnical investigation, performed on December 10, 2013 was conducted during a moderate drought condition (D1, as noted by the National Weather Service and U.S. Drought Monitor). The National Oceanic and Atmospheric Administration (NOAA) reports for the subject date indicated that no significant rainfall observations (at least one inch) occurred prior to or during our exploration that could have significant effects on any groundwater levels or moisture content of surface soils.

SITE INVESTIGATION

Soil Borings and Laboratory Tests

Subsurface conditions at the site were evaluated through two (2) structural borings (designated as B-#) drilled to a depth of twenty-five (25) feet below natural ground elevation, and two (2) pavement borings (designated as P-#) drilled to a depth of ten (10) feet below natural ground at the locations shown on Figure 2 of [Appendix A](#). The soil borings were drilled and sampled in general accordance with American Society of Testing Materials Procedures (ASTM) D1452, D1586, and D1587 using a truck mounted drilling rig (Simco 2800 HS (HT)) and solid stem augers.

As part of the sampling procedures, split barrel (spoon) and Standard Penetration Tests (SPT) were performed and recorded. Standard Penetration Test results are noted on the boring logs as blows per foot or twelve (12) inch increment. The sampler was advanced through three (3) consecutive six inch increments; however, the first six inch increment is considered the seating

drive, which eliminates the effect of cuttings or disturbances on the test result. The sum of the blows for the last two six (6) inch increments is considered the “standard penetration resistance value” or “field N-value”. Where hard or very dense materials were encountered, the SPT was terminated and noted on the boring log when one of the following situations occurred:

1. *a total of 50 blows were applied on one six inch increment*
2. *a total of 100 blows were applied during the test*
3. *no observation of advancement of the sampler was detected during the application of ten (10) consecutive blows from the hammer*

Representative portions of the split barrel samples were identified, packaged, sealed in containers to reduce moisture loss, and transported to our laboratory for subsequent testing. In the laboratory, each sample was evaluated and visually classified by a member of our geotechnical engineering staff. The properties of each stratum were evaluated by a series of laboratory index tests. A summary of the laboratory data and their corresponding depths are presented on the boring logs. Samples will be retained in our laboratory for 30 days after submittal of this report. Other arrangements may be provided at the request of the Client to hold the samples through the construction process.

Subsurface Stratigraphy

Based on the results of the field and laboratory sample analyses, the subsurface stratigraphy at the project location can be characterized as follows (Tables 1A-1B):

Structural Borings (B-01 through B-02)			
Description	*Approximate Depth Range (ft.)	Material Type	Consistency / Density
Stratum I	0 to 5	Silty Clayey Sand, Clayey Sand ¹	Very Loose to Medium Dense
Stratum II	5 to 25	Clayey Sand ²	Medium Dense to Very Dense
1. This stratum contained a mixture of dark brown clayey sand (SC) and silty clayey sand (SC-SM) with low to moderately low plasticity indices (ranging from 6 to 12). These soils contained approximately 31 to 36% fine soil particle contents (clays & silts). SPT N-values ranged from 9 to 14 blows per foot (outlier noted in B-02 showing 3 blows per foot). Samples were noted as dry.			
2. This stratum contained light brown clayey sand (SC) with moderately low to moderate plasticity indices (ranging from 9 to 23). These soils contained approximately 27 to 47% fine soil particle contents (clays & silts). SPT N-values ranged from 12 blows per foot to 50 blows per three inches (ranging from 12 to 24 blows per foot in the upper 8 feet and 43 blows per foot to 50 blows per three inches below that). Samples were noted as dry.			

Table 1A – Existing Soil Strata & Description (Structural Borings B-01 through B-02)

**all depths are referenced from existing natural ground*

Pavement Borings (P-01 through P-02)			
Description	*Approximate Depth Range (ft.)	Material Type	Consistency / Density
Stratum I	0 to 6	Clayey Sand, Silty Clayey Sand ¹	Very Loose
Stratum II	6 to 10	Silty Clayey Sand, Silty Sand ²	Very Loose to Medium Dense
1. This stratum contained dark brown clayey sand (SC) with light brown sections (noted at P-02) and with low plasticity indices (8). These soils contained approximately 30 to 34% fine soil particle contents (clays & silts). Soil samples showed evidence of small roots. SPT N-values ranged from 4 to 6 blows per foot. Samples were noted as dry.			
2. This stratum contained a mixture of light brown to light tannish brown clayey sand (SC) and sandy lean clay (CL) with moderately low to moderate plasticity indices (ranging from 15 to 24). These soils contained approximately 35 to 50% fine soil particle contents (clays & silts). SPT N-values ranged from 5 to 8 blows per foot. Samples were noted as dry.			

Table 1B – Existing Soil Strata & Description (Pavement Borings P-01 through P-02)

**all depths are referenced from existing natural ground*

It should be noted, the Soil Strata and Description illustrated in Tables 1A-1B, are typical summarized representation of the site stratigraphy. The lines designating the interfaces between strata on the boring logs represent approximate boundaries. Transitions between strata may be gradual and may occur at varying depths.

Water Strikes

The solid auger and mud rotary drilling techniques were used to complete soil borings in accordance with ASTM procedure D1452. Water strikes were not encountered during the drilling operations at any boring location.

It should be noted that fluctuations in groundwater levels are influenced by variations in rainfall and surface water run-off from season to season. The construction process itself may also cause variations in the groundwater level. If the subsurface water elevation is critical to the construction process the Contractor should check the subsurface water conditions just prior to construction excavation using piezometer wells.

GEOTECHNICAL BORING ANALYSIS

Moisture Content

The moisture content of a soil is defined as the ratio of the weight of the water in the sample to the dry weight of the soil sample. The moisture contents for the samples obtained as part of our geotechnical exploration were performed in compliance with ASTM procedure D2216. The results varied from two (2) percent to eight (8) percent. The variance in percentages within a given exploratory boring can be attributed to a multitude of issues including, range in depth, distance between samples, location of groundwater table and seasonal moisture zone. The variation could also be caused by differences in soil classifications, as some soils such as loose gravels and sands are made up of larger particles and thus exhibit more voids as a soil structure (higher capability to hold water than fine grained soils). Finer grained denser soils, though, due

to high impermeability, may also exhibit high moisture contents in certain instances due to the slower movement of water through the soil structure. All samples in this geotechnical exploration exhibited dry field moisture conditions. A list of all the moisture contents by corresponding depth can be found on the boring logs.

Plasticity Index

The Plasticity Index (PI) is defined as the difference between the liquid limit and the plastic limit of a soil. These limits are commonly referred to as the Atterberg limits, which describe the consistency of soils with respect to their varying moisture contents. The liquid limit is defined as the moisture content at which soil begins to transition from a plastic to a liquid state and begins to behave as a liquid material by beginning to flow. The plastic limit refers to the water content of a soil at the point of transition from a semisolid to a plastic state where soil starts to exhibit plastic behavior. A soils behavior can be divided into four basic states: liquid, plastic, semisolid and solid. The plasticity index shows the range in which a soil acts in a plastic state. Experience has shown that the more plastic a soil is the more expansive and compressive it will act. The plasticity indices for the samples obtained as part of our geotechnical exploration were performed in compliance with ASTM procedure D4318. PI values for the borings performed for this report range from eight (8) (moderately low plasticity clayey sands) to 24 (moderate plasticity clayey sands and sandy clays).

Particle Size Analysis (Determination of Fines Content)

The standard grain size analysis is used to determine the relative proportions of different grain sizes as they are distributed along a range of different sized sieves. The minus 200 sieve analysis is used commonly as a tool for soil classification and identification using the Unified Soils Classification System. Results for this test are reported as a percentage of soil passing the No. 200 sieve, which has openings 0.075mm wide. This test is also used to determine the suitability of soil for construction purposes and to estimate probable seepage through soils. Generally a % - 200 greater than 50% indicates a non-granular cohesive soil with large amounts of fines in the soil composition. The particle size analyses for the samples obtained as part of our geotechnical exploration were performed in compliance with ASTM procedure D1140. The % -200 values for the samples collected range from 27% to 61%.

FOUNDATION RECOMMENDATIONS

Proposed Project Foundation System Information

The proposed facility, as previously noted, will be constructed throughout the proposed project site. At the time this report was written, the Client had specified general slab on grade construction with potential shallow square footings at column/high load locations and perimeter grade beams was to be the primary foundation system (if possible) for shallow foundations on-site. No specific construction techniques were provided to **L&G** at the time this report was written. It should be noted, the selection of an appropriate type of foundation design is based on several factors including, but not limited to, soil conditions, site drainage, economics, climate, vegetation, city/government codes, and the level of risk acceptable to the owner/developer.

The most commonly constructed and typically most cost effective foundation system built in the South Texas Area is the Slab on Grade system (including a steel reinforced concrete slab). The

Slab on Grade foundation is intended to be supported in the shallow surface soils through the use of a monolithic slab; however, these foundations can be complemented through the use of exterior and interior stiffened grade beams and/or shallow footings to support concentrated perimeter or wall loads and column loads respectively. For these systems, the compatibility between foundation rigidity and the type of superstructure (building type) to be built on the foundation must be considered in order to avoid damage to the building superstructure and architectural components.

The foundation system selected for construction must be designed with sufficient bearing capacity to resist the imposed loadings without experiencing failure of the underlying soils. The foundation system must also resist soil movements, or volume change, from expansion and contraction of soils due to changes in moisture content. The following sections will provide allowable bearing capacities, potential vertical rise (including earthwork recommendations to minimize shrink and swell), and Slab on Grade design parameters (Welded Reinforcement Institute – WRI, Post-Tensioning Institute – PTI). It should be noted that the recommendations provided are based on geotechnical properties of the project soils and assumptions of construction of this type since no structural loadings were provided. If structural loadings exceed capacities as provided in this report, **L&G** should be advised of the loadings to re-analyze and provide alternate recommendations if needed.

It is important to stress the fact that maintenance of Slab on Grade foundations will help to reduce the potential for structural damage in the present and for the life of the structure. Maintenance can include, but is not limited to procedures such as:

1. Ensure positive drainage around the perimeter of the foundation through site grading
2. Incorporate paving or sidewalks adjacent to foundations for moisture protection
3. Do not plant vegetation closer to the foundation than its mature height
4. Extend canopies or roof drains away from foundation to prevent ponding near foundation
5. Avoid excess wetting or drying of soils around foundations

Bearing Capacity of Soils (Shallow Foundations)

The bearing capacity of the existing natural ground is defined as the ability of a foundation to safely support the imposed loadings (surcharge), without experiencing any form of shear failure. The ultimate bearing capacity is a measure of the soil's maximum resistance immediately prior to a bearing capacity failure. The ultimate bearing capacity was estimated using the methods and equations, as recommended by the USACE in Manual EM 1110-1-1905 titled "Bearing Capacity of Soils"

$$q_u = c N_c \zeta_c + \frac{1}{2} B \gamma_h N_\gamma \zeta_\gamma + \sigma N_q \zeta_q$$

where:

q_u = ultimate bearing capacity

c = soil cohesion

B = effective width of foundation

γ_h = effective unit weight of soil within failure zone

σ = effective soil surcharge pressure at depth

N_c, N_γ, N_q = Bearing capacity factors

$\zeta_c, \zeta_\gamma, \zeta_q$ = dimensionless correction factors for cohesion, soil unit weight, and surcharge

N_c , N_γ , and N_q are the dimensionless bearing capacity factors developed by Meyerhof, Hansen, and Vesic for general shear failure listed in Table 4-4 of EM 1110-1-1905. Cohesion values for cohesive soils and angle of friction values for granular soils were estimated using a correlation with the Standard Penetration Tests performed in the field. All correlations used were in accordance with the applicable USACE manuals. Where cohesive material was prevalent, the angle of friction value was conservatively assumed to equal zero.

The factor of safety used in our analysis was equal to 3.0, as recommended by Chapter 1 of EM 1110-1-1905. The absolute minimum factor of safety, as recommended by Chapter 1 of EM 1110-1-1905 for this construction is 2.0. The maximum allowable bearing capacity was calculated by dividing the ultimate bearing capacity by the factor of safety. All recommendations reflect the maximum allowable bearing capacity in pounds per square foot.

Bearing Capacity of Slab on Grade Foundation

The maximum allowable bearing capacity for the Slab on Grade foundation is 1,500 pounds per square foot. It should be noted, bearing capacity was calculated assuming square or rectangular foundation geometry with width to length ratio of 1:2.

Bearing Capacity of Shallow Square Footings

Square footings may be used to support concentrated column loads for the structure. **The maximum allowable bearing capacity for Square Footings is 3,000 pounds per square foot.** Footings should bear in subgrade material at a minimum twenty-four (24) inches below proposed bottom of slab (bottom of footing shall be placed at least 6 inches into subgrade). This recommendation is for the proper development of bearing capacity and is not based on structural considerations. The footing reinforcement should be designed by a structural engineer to resist the dead load of the structure and the live loadings caused by all pertinent loadings using the load combinations and factors of safety provided by the applicable building codes.

Bearing Capacity of Perimeter Footings (Grade Beams)

Perimeter footings (also called Grade Beams) may be constructed around the slab foundation to support the exterior wall loads of the structure. **The maximum allowable bearing capacity for Perimeter Footings (Grade Beams) is 2,500 pounds per square foot.** Footings should bear in subgrade material at a minimum twenty-four (24) inches below proposed bottom of slab (bottom of footing shall be placed at least 6 inches into

subgrade). This recommendation is for the proper development of bearing capacity and is not based on structural considerations. The footing reinforcement should be designed by a structural engineer to resist the dead load of the structure and the live loadings caused by all pertinent loadings using the load combinations and factors of safety provided by the applicable building codes.

Potential Vertical Rise (Slab on Grade)

The soils at this site consisted of primarily moderately low moderate plasticity clayey sands throughout the soil profile (becoming more plastic with depth), which have a moderately low to potential for exhibiting appreciable differential movements or swell/shrink capabilities with moisture changes. The Potential Vertical Rise (PVR) calculations for the general soil profile were performed using the Texas Department of Transportation's (TxDOT) TEX 124-E method. Based on review of the soil log (clayey sand / silty clayey sand in top 5 to 6 feet and clayey sand below that depth), water table observation (no water strike encountered), geometric configuration of the area, and typical climatic conditions of the area (generally very hot humid climate).

Based on the soil profile and assumptions previously noted, the average existing PVR was calculated to be approximately **0.6 inches**. This value represents total vertical in-situ movements and does not consider differential swell between any two points on the ground; nor does it take into account movements caused by uncontrolled water sources such as poor drainage, migration of subsurface water from off-site locations, and utility line leaks. Typically, PVR values of around **1 inch** are considered acceptable for most at grade or shallow foundation designs. Based on the results of the calculations as noted, the project site soil conditions do not warrant any major earthwork to counteract potential shrink/swell capabilities. **L&G** does recommend, however, building pad be constructed in accordance with 'Site Grading', 'Site Drainage' and 'Site Preparation' sections of this report. In addition, **L&G** recommends building pad be constructed atop a minimum 12 inches of **Structural Fill** (Recommended). Fill shall meet the requirements of and shall be installed in accordance with the 'Select Fill & Structural Fill Recommendations' section of this report.

Post-Tensioning Institute (PTI) Slab Design Parameters

The recommendations for foundation design criteria in this section have been calculated using the method described by the Post-Tensioning Institute manual, "Design of Post-Tensioned Slabs-on-Ground" Third Edition; also known as the PTI method. This method gives soil parameters for ribbed or uniform thickness (monolithic) foundations that can be used in the design of post-tensioned or traditionally reinforced foundations. The PTI method does not allow for the development of design parameters for collapsing soils or other highly unusual conditions. It must be emphasized that the determination of these parameters is based upon normal climate-moisture variance from season to season in the local area and are invalid when influenced to any significant degree by other conditions, including but not limited to those mentioned in the previous sections.

The edge moisture variation distances (e_m) for the center and edge lift conditions were derived based on a Thornthwaite index of -32 for the project site. The Thornthwaite index is based on the average rainfall over a significant period of time (e.g. 20 or 30 years) in excess or deficit of the average evapotranspiration rates of the area. Other parameters and influencing variables

were derived using information collected from the laboratory tests performed on the recovered soil samples as stated in the PTI guidelines for geotechnical exploration and laboratory testing schedule. [Table 2](#) lists the PTI design parameters for a slab-on-grade foundation supported in the shallow surface soils.

	Center Lift Conditions		Edge Lift Conditions	
Equilibrium Soil Suction (pF)	Center Moisture Variation Distance e_m (ft)	Est. Differential Movement y_m (in)	Edge Moisture Variation Distance e_m (ft)	Est. Differential Movement y_m (in)
4.07	9.00	0.14	4.80	0.52

Table 2 - Recommended PTI Slab Design Parameters

Wire Reinforcement Institute (WRI) Slab Design Parameters

The Wire Reinforcement Institute (WRI) method is an empirically derived foundation design method that was developed by observing slab performance over time and creating and modifying equations to give results which approximate foundation designs that exhibit the best results. While the WRI method deals only with foundations reinforced with reinforcing bars or welded wire reinforcement, the procedure has been developed to be independent of the type of reinforcement used.

The climatic rating reflects the stability of the moisture content which may be expected in the soil due to the climatic conditions which may vary from year to year. The effective design Plasticity Index was obtained by weighting the test values in each boring as described in the WRI procedures. The slope correction factor is based on the average slope of the tract of land. Since the slope is relatively small (as shown on Figure 4 in [Appendix A](#)) the adjustment factor was negligible. [Table 3](#) lists these WRI design parameters for a slab-on-grade foundation supported in the shallow surface soils.

Effective PI	Climatic Rating	Slope Coefficient	Soil Support Index, C
15	15	1.0	1.0

Table 3 - Recommended WRI Slab Design Parameters

GENERAL CONSTRUCTION CONSIDERATIONS

General Site Soils & Conditions Construction Recommendations

Loose, clayey sands and silty clayey sands were found near the surface in the borings at this site. While these soils (in their present state) will safely support the loads indicated in the 'Foundation Recommendations' section of this report, they are particularly susceptible to disturbance during construction. If site grading or structural excavations penetrate these materials, special measures will be necessary to limit disturbance and maintain the strength of these soils. Drainage sumps, wells, or other methods should be utilized to prevent accumulation of water and resulting mixing with and weakening of these soils. Prior to placement of structures onto this material it should be proof rolled and evaluated by **L&G** representatives (if material has softened it should be re-

evaluated for engineering design). If severe disturbance / soil softening are noted, it may be necessary to place and compact additional layers of structural fill prior to installation of structures.

Site Grading Recommendations

Site grading plans can result in changes in almost all aspects of foundation recommendations. We have prepared the foundation recommendations based on the existing ground surface and the stratigraphic conditions encountered at the time of our study. We recommend gradual slopes away from foundations at structure locations to assist with site drainage, ponding, and potential shrink/swell issues. Based on the upper site soils, erosion and slope sloughing, causing for periodic maintenance are limitations when utilizing 2:1 slopes or steeper. We recommend the use of 3:1 slopes (or flatter) for general site grading.

Site Drainage Recommendations

Drainage is one of the most important aspects to be addressed to ensure the successful performance of any foundation. Positive surface drainage should be implemented prior to, during and maintained after construction to prevent water ponding at or adjacent to the proposed facilities. We advise that construction drainage programs be implemented to assist with standing waters from precipitation, general surface runoff or other moisture intrusion. It is recommended that the site design include site drainage features to channel runoff away from the proposed site location and most importantly away from all shallow foundations.

Site Preparation Recommendations

The proposed site areas and all areas used to support foundation construction should be cleared and grubbed of all vegetation, organic topsoil and other miscellaneous debris up to a minimum of two (2) feet beyond the proposed site perimeters. This shall include the removal of all trees, brush, roots, weeds, or other organic debris that will interfere with construction. After clearing, the contractor should follow the earthwork procedures outlined in the 'Foundation Recommendations' section of this report. Any soft and/or compressible soft spots noted during compaction activities shall be over-excavated and replaced with Select Fill. All placements of **Select Fill** and **Structural Fill** shall be in accordance with the 'Select Fill & Structural Fill Recommendations' section of this report. Any excavation/backfill activities should be observed by **L&G** representatives to document subgrade preparation.

Select Fill & Structural Fill Recommendations

Materials used for **Select Fill** (General Site Grading) shall meet the following requirements:

1. Soils classified according to the Unified Soils Classification System as SM, SC, GM, GC, CL, ML and combinations of these soils. These soils shall be free of organic material, topsoil, debris, or other deleterious material that cannot be properly compacted. In addition to the USCS classification, select materials shall have a **liquid limit of less than 40 and a plasticity index between 8 and 20**.
2. Soils classified as CH, MH, OH, OL and PT, under the USCS are not considered suitable for use as select fill materials at this site.

3. **L&G** recommends additional quality control of all ‘General Site Fill’ materials as they are placed and compacted to ensure that they meet the requirements specified.

Select Fill shall be placed in lifts not to exceed 8 inches loose (6 inches compacted) and compacted to a minimum 95 percent of the maximum dry density as determined in accordance with ASTM D698. The water content of the fill shall be maintained within the range of optimum moisture to three (3) percentage points above the optimum moisture content until the fill is permanently covered. The fill should be properly compacted in accordance with these recommendations and tested for compaction as specified.

Materials used for **Structural Fill** shall meet the following requirements:

1. Soils classified as Base Material meeting the requirements of TxDOT 2004 Specification Item 247 Type E, Grade 4 - Caliche (see [Table 5](#) for specifications and requirements) or Item 247 Type A, Grade 1 - Limestone (see [Table 6](#) for specifications and requirements).
2. **L&G** recommends additional quality control of all **Structural Fill** materials as they are placed and compacted to ensure that they meet the requirements specified.

Structural Fill shall be compacted to a minimum 98 percent of the maximum dry density as determined by the ASTM D698 at moisture contents ranging between minus two (-2) and plus two (+2) percentage points of the optimum moisture content. **Structural Fill** shall be placed in loose lifts not to exceed 8 inches (6 inches compacted). The fill should be properly compacted in accordance with these recommendations and tested for compaction as specified.

Retained on Square Sieve	Percent Retained
2"	0
$\frac{1}{2}$ "	20-60
No. 4	40-75
No. 40	70-90
Plasticity Index, max	15
Wet Ball PI, max	15
Wet Ball Mill, % max	50

Table 5 – Structural Fill - Type E Grade 4 Specifications

Retained on Square Sieve	Percent Retained
2-½"	0
1-¾"	0
7/8"	10-35
3/8"	30-50
No. 4	45-65
No. 40	70-85
Liquid Limit, % max	35
Plasticity Index, % max	10
Wet Ball Mill, % max	40

Table 6 – Structural Fill - Type A Grade 1 Specifications

Excavation, Sloping, Benching and Utility Considerations

If trenches are to extend to or below a depth of five (5) ft, the contractor or persons doing the trenching should adhere to the current Occupational Health and Safety Administration (OSHA) guidelines on trench excavation safety and protection measures or other applicable industry standards. The collection of specific geotechnical data and development of a plan for trench safety, sloping, benching or various types of temporary shoring, is beyond the scope of this study. Utilities that protrude through the slab-on-grade should be designed with some degree of flexibility or with sleeves. Such features will help reduce the risk of damage to utility facilities from soil movements related to shrinkage and expansion. Furthermore, when trenching for utility installation, we recommend that the backfill used to protect these utilities conform to the recommendations presented in the ‘Select Fill Recommendations’ section of this report.

PAVEMENT RECOMMENDATIONS

Background Information

The pavement recommendations contained in this report were limited to the data recovered from the field and laboratory testing performed for the borings. No traffic loading data was presented for the proposed parking lot. Our recommendations are based on design procedures found in the Army Corps of Engineers Manuals EM 1110-3-131 (Flexible Pavement Design) and our experience with similar soils and site conditions. The traffic composition used in our analysis was grouped under ‘Category I’, which is comprised of traffic essentially free of trucks (not more than 1% two-axle trucks). The road type selected was ‘Class E’, with a flat slope and low volume (under 1,000 average daily vehicles).

Subgrade Analysis

The existing subgrade index properties (plasticity index and grain size) were used to correlate the Modulus of Soil Reaction (k) and the California Bearing Ratio (CBR) values of the subgrade. These values were then applied to the corresponding design procedures, according to the applicable Army Corps of Engineers manuals to determine the recommended minimum pavement thickness for flexible pavement designs. A subgrade k value of **215 pci** and a CBR value of **12** were utilized in the pavement designs.

Pavement Section Recommendations

After completing the pavement designs and analyzing several options for construction, **L&G** has provided the following options within Table 7 for pavement thickness:

Flexible Pavement Design Recommendations		
Materials	Design #1	Design #2
Asphalt Pavement (ACP)	2.0 in.	2.0 in.
Crushed Limestone (Ty.A Gr.1)	6.0 in.	
Caliche Base (Ty.E Gr.4)		6.0 in.
Compacted Subgrade	6.0 in.	6.0 in.

Table 7 – Flexible Pavement Options

Pavement Material Specification Recommendations

Asphaltic Concrete Pavement (ACP) Surface

The asphalt concrete pavement (ACP) surface shall meet the requirements of the current TxDOT 2004 Specification Item 340 for Type D Hot Mix Asphaltic Concrete. The hot mix asphaltic surface will be compacted to between 91 and 96 percent of the maximum theoretical density in conformance with the specification. The grade of the asphalt cement should contain a minimum PG 64-22 asphalt binder. It is recommended that the testing required by this specification be performed during production and placement by a representative of **L&G**.

Flexible Base Material (Crushed Limestone)

The crushed limestone material shall meet the requirements of TxDOT 2004 Specification Item 247 Type A, Grade 1. The limestone base shall conform to the gradation and properties requirements as previously presented in Table 6 – Structural Fill - Type A Grade 1 Specifications. The Wet Ball Test (Tex-116-E) and the Plasticity Index shall be run with the material passing the No. 40 sieve. The base shall be compacted to a minimum 98 percent of the maximum dry density as determined by the standard moisture density relation at moisture contents ranging between minus two (-2) and plus two (+2) percentage points of the optimum moisture content. The base shall be placed in loose lifts not to exceed 8 inches (6 inches compacted).

Flexible Base Material (Caliche)

The caliche base material shall meet the requirements of TxDOT 2004 Specification Item 247 Type E, Grade 4 as approved by the engineer. Caliche base shall conform to the gradation and properties requirements as previously presented in Table 5 – Structural Fill - Type E Grade 4 Specifications requirements **before** lime or admixtures are added. The Wet Ball Test (Tex-116-

E) and the Plasticity Index shall be run with the material passing the No. 40 sieve. The base shall be compacted to a minimum 98 percent of the maximum dry density as determined by the standard moisture density relation at moisture contents ranging between minus two (-2) and plus two (+2) percentage points of the optimum moisture content. The base shall be placed in loose lifts not to exceed 8 inches (6 inches compacted). Lime treated caliche base material shall meet all the previous requirements and contain a minimum of two (2) percent lime or Portland Cement by weight. Lime and cement treatments shall be in compliance with all applicable sections of TxDOT Item 260 and 275 specifications.

Compacted Subgrade

The subgrade layer shall be compacted and moisture conditioned to a minimum 95 percent of the maximum dry density at moisture contents ranging from minus two (-2) to plus three (+3) percentage points of the optimum moisture content. Based on the soil properties and in-situ strength conditions, no further treatment is warranted. It should be noted, however, the addition of small percentage of lime and/or cement (usually no more than 3%) is typically utilized to enhance strength and provide a solid working platform for the construction.

General and Miscellaneous Recommendations

Adequate perimeter drainage is essential for long-term performance of any pavement structure. Infiltration of surface water from unpaved areas surrounding the pavement should be minimized. Base materials under curb and gutters should be compacted to the same requirements as other areas. It is recommended that these curb and gutters be extended through the base and a minimum of three (3) inches into the subgrade. This will reduce the potential of intrusion of moisture from adjacent areas. An adequate seal should be provided at all base-asphalt interfaces.

A maintenance plan is recommended for the long-term performance of paved areas. Asphaltic pavements have a tendency to strip and become oxidized with exposure to the elements. Thus cracks may become present in the pavement. It is recommended that a maintenance schedule of biannual crack sealing, fog seals and overlays every five to ten years be used over the life of the pavement.

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11. Das, Braja M., "Principles of Foundation Engineering, 6th Edition", July 2006.

APPENDIX A – FIGURES

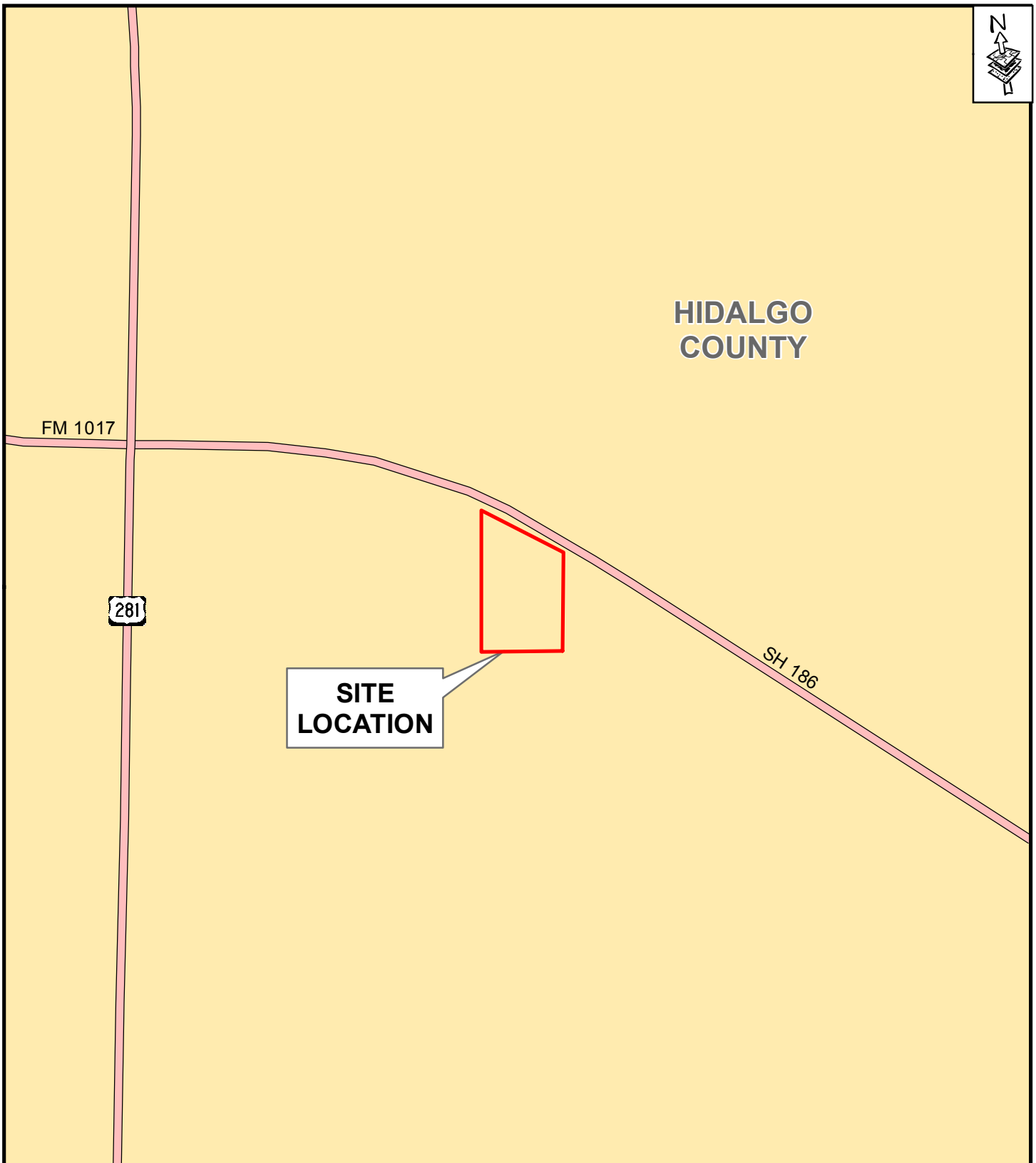


Figure 1
Hidalgo Co. Pct. No. 4
Emergency Services Facility
Location Map

Legend

-  **Site Location**
-  **Counties**
-  **State Roads**

400
Feet
1 inch = 400 feet

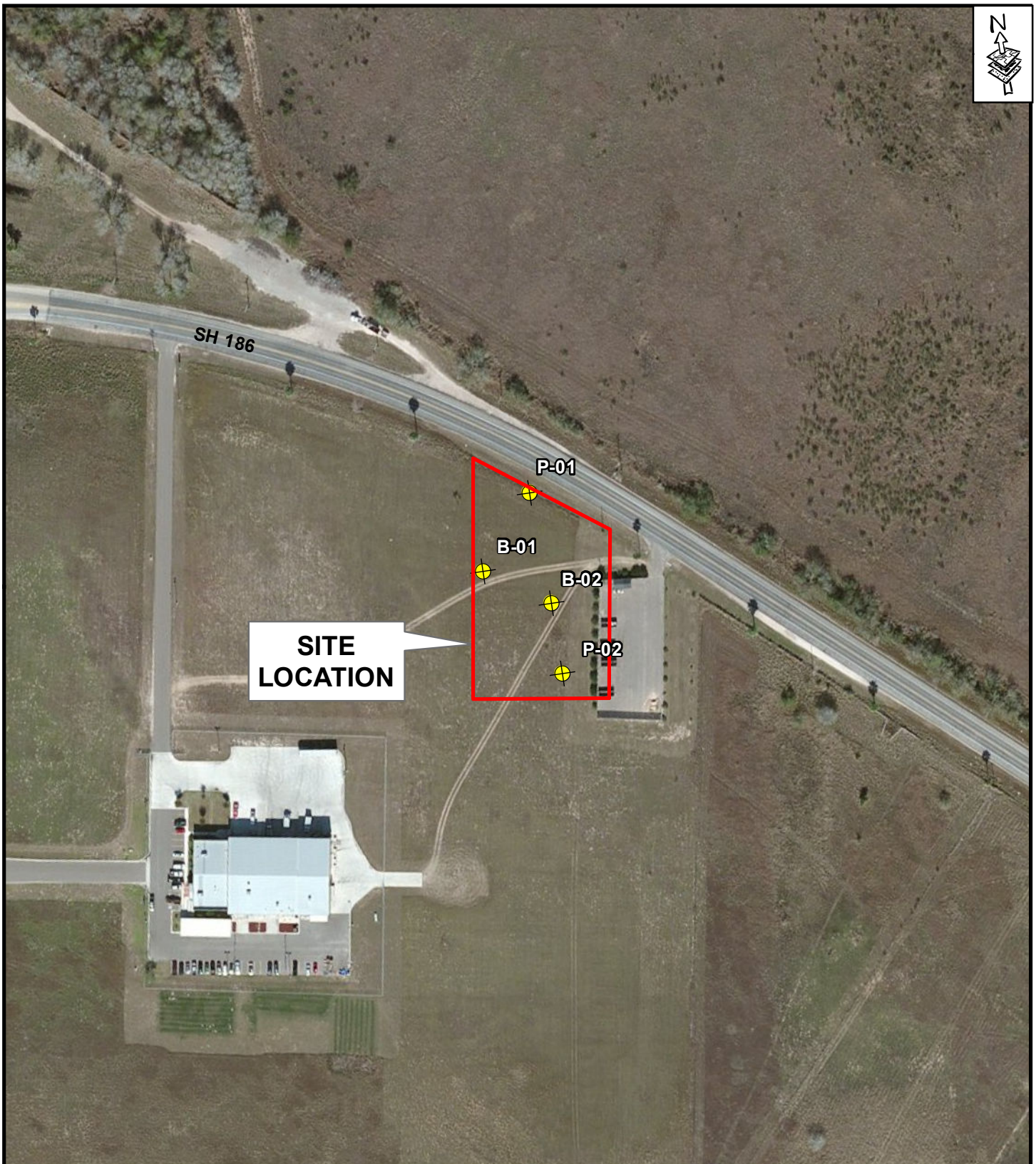


Figure 2
Hidalgo Co. Pct. No. 4
Emergency Services Facility
Boring Map

Legend

-  **Boring Locations**
-  **Site Location**

200
 Feet
 1 inch = 200 feet

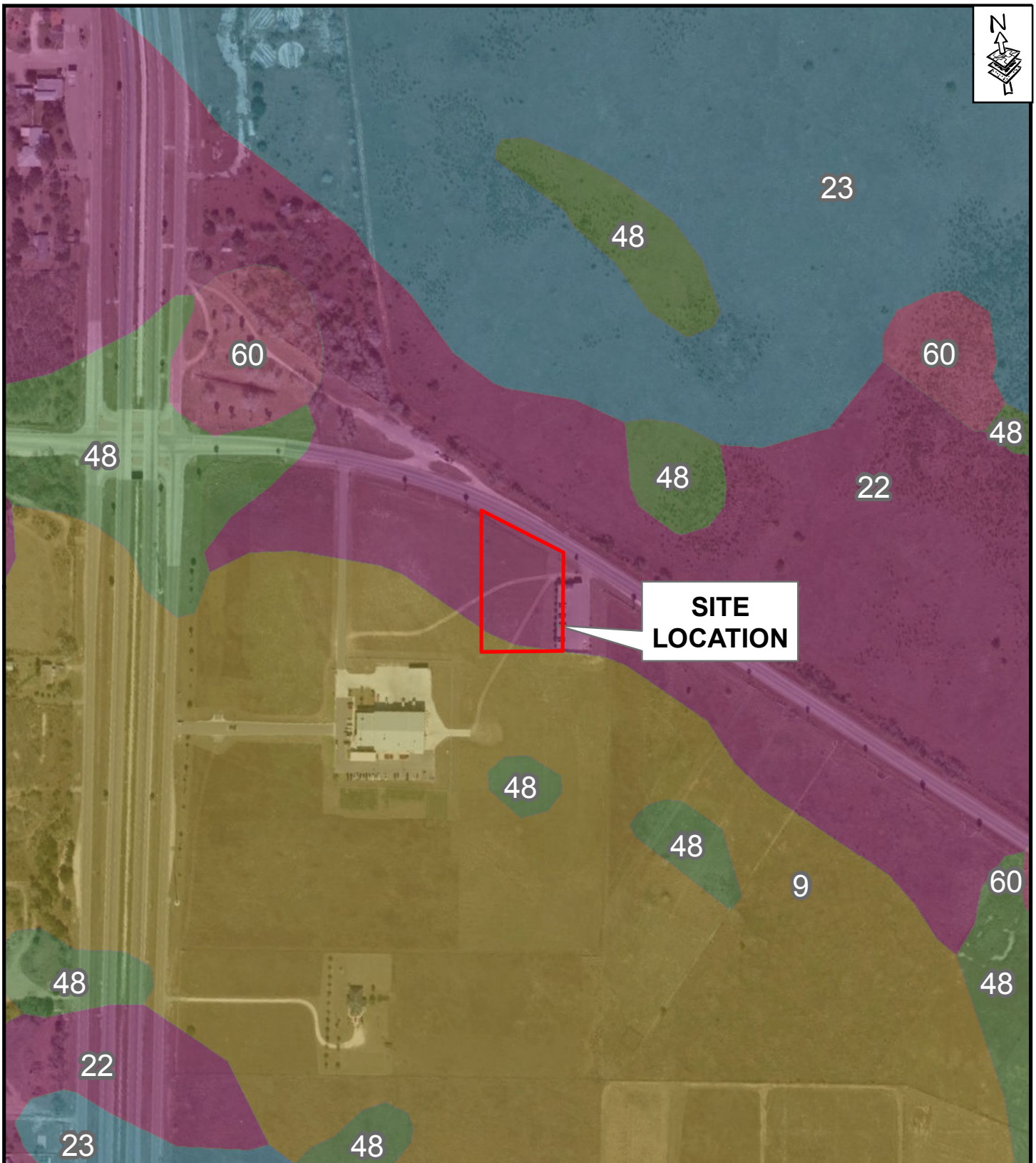


Figure 3
Hidalgo Co. Pct. No. 4
Emergency Services Facility
Soil Classification Map
 USDA SOIL CONSERVATION
 SERVICE

Legend

- Site Location
- 22 - Hebbronville Sandy Loam, 0 to 1% slopes
- 9 - Delfina Loamy Fine Sand, 0 to 3% slopes

400
 _____ Feet
 1 inch = 400 feet

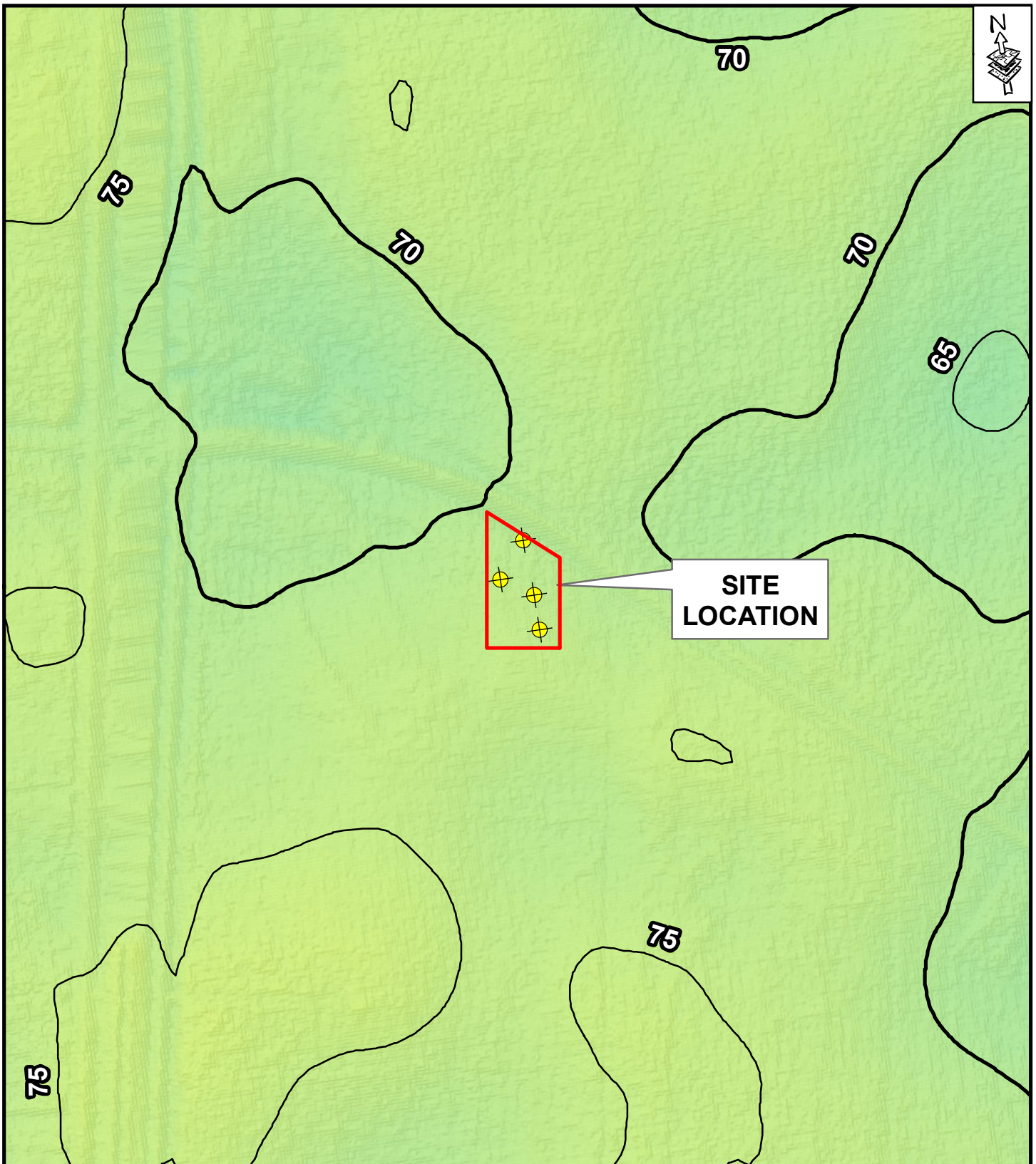


Figure 4
Hidalgo Co. Pct. No. 4
Emergency Services Facility
Digital Elevation Map

Legend

	Borehole Locations
	Site Location
	1 ft Contours
	5 ft Contours
	10 ft Contours

Value

High

Low

400 Feet

1 inch = 400 feet

L&G Engineering Laboratory, I.L.C.
 Construction Material Testing
 Geotechnical Engineering

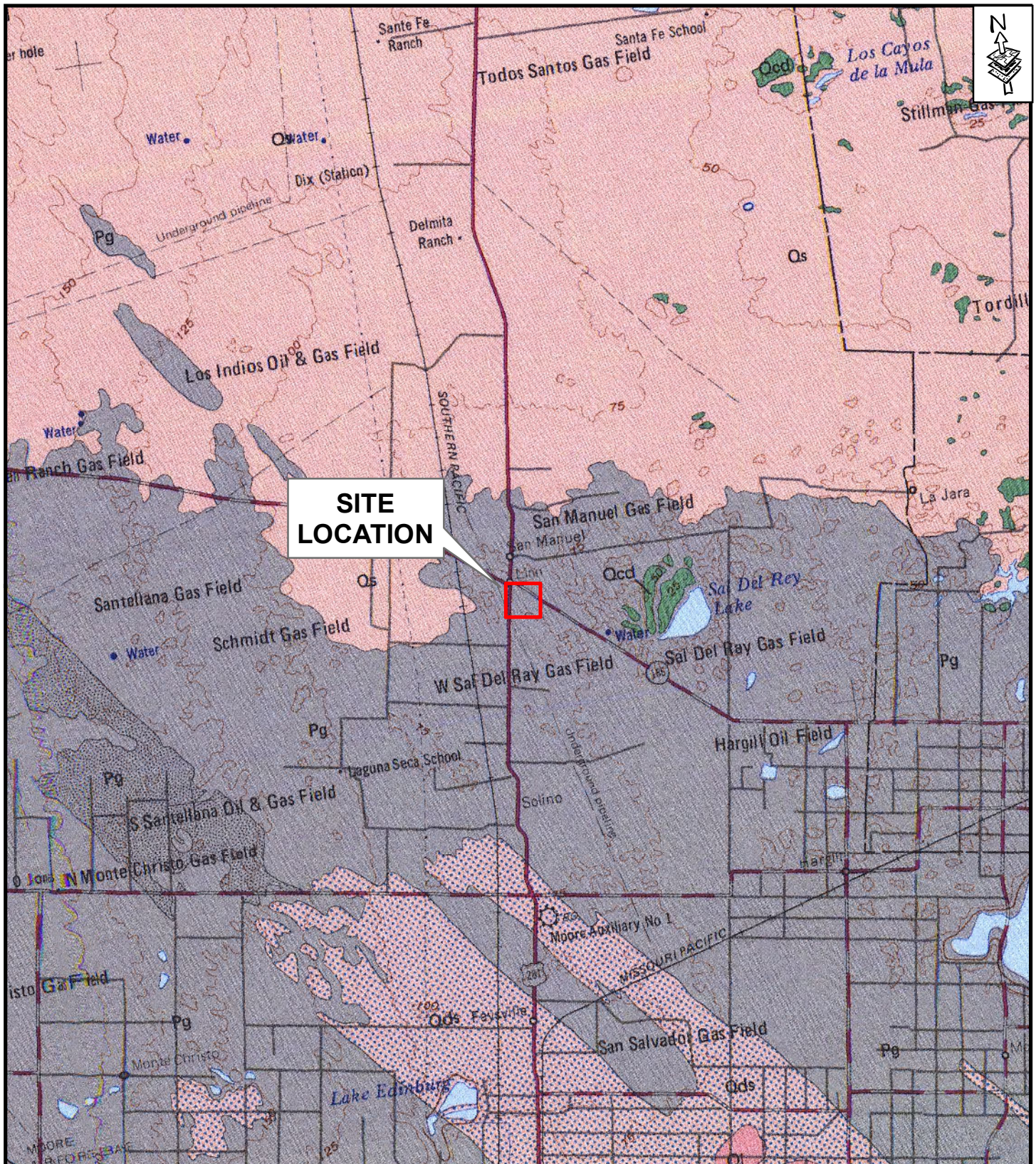


Figure 5
Hidalgo Co. Pct. No. 4
Emergency Services Facility
Geologic Atlas of Texas Map

Legend

- Site Location**
- Goliad Formation**

APPENDIX B – BORING LOGS

CLIENT Hidalgo County Pct. 4

PROJECT NAME Emergency Services Facility

PROJECT NUMBER GL13032

PROJECT LOCATION Hidalgo County

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)



CL: USCS Low Plasticity Clay



SC: USCS Clayey Sand



SC-SM: USCS Clayey Sand

SAMPLER SYMBOLS



Shelby Tube



Standard Penetration Test

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION
▽ Water Level at Time
Drilling, or as Shown
▼ Water Level at End of
Drilling, or as Shown
▽ Water Level After 24
Hours, or as Shown

**L&G Engineering Laboratory**Construction Material Testing
Geotechnical EngineeringL&G Engineering Laboratory LLC
2100 W. Expressway 83
Mercedes TX 78570
Telephone: 956-565-0760**BORING NUMBER B-1**

PAGE 1 OF 1

CLIENT Hidalgo County Pct. 4**PROJECT NAME** Emergency Services Facility**PROJECT NUMBER** GL13032**PROJECT LOCATION** Hidalgo County**DATE STARTED** 12/10/13 **COMPLETED** 12/10/13**GROUND ELEVATION** 73 ft **HOLE SIZE** 4 inches**DRILLING CONTRACTOR** L&G Engineering Laboratory**GROUND WATER LEVELS:****DRILLING METHOD** Solid Stem Auger**AT TIME OF DRILLING** --- No Water Strike Encountered**LOGGED BY** R. Cantu **CHECKED BY** D. Saenz, P.E.**AT END OF DRILLING** ---**NOTES** GPS 26°33'19.60"N, 98°07'09.40"W (Elev. Approx.)**AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		(SC) Clayey Sand, Lean, Dark Brown to Orange - Brown, Medium Dense, Dry	SPT 1		3-4-7 (11)			6				31
			SPT 2		9-7-7 (14)			3	27	15	12	
5		(SC) Clayey Sand, Lean, Light Brown, w/ Calcareous Nodules, Medium Dense, Dry	SPT 3		7-8-9 (17)			3				
			SPT 4		9-7-6 (13)			3				47
			SPT 5		11-12-11 (23)			4	37	21	16	
15		(SC) Clayey Sand, Lean, Light Brown, w/ Calcareous Nodules, Very Dense, Dry	SPT 6		31-37-44 (81)			6				37
			SPT 7		50/5"			9	46	23	23	
25		(SC) Clayey Sand, Lean, Grayish Light Brown, Very Dense, Cemented Sections, Dry	SPT 8		16-23-43 (66)			7				27

Bottom of borehole at 25.0 feet.

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**L&G Engineering Laboratory**Construction Material Testing
Geotechnical EngineeringL&G Engineering Laboratory LLC
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Mercedes TX 78570
Telephone: 956-565-0760**BORING NUMBER B-2**

PAGE 1 OF 1

CLIENT Hidalgo County Pct. 4**PROJECT NAME** Emergency Services Facility**PROJECT NUMBER** GL13032**PROJECT LOCATION** Hidalgo County**DATE STARTED** 12/10/13 **COMPLETED** 12/10/13**GROUND ELEVATION** 73 ft **HOLE SIZE** 4 inches**DRILLING CONTRACTOR** L&G Engineering Laboratory**GROUND WATER LEVELS:****DRILLING METHOD** Solid Stem Auger**AT TIME OF DRILLING** --- No Water Strike Encountered**LOGGED BY** R. Cantu **CHECKED BY** D. Saenz, P.E.**AT END OF DRILLING** ---**NOTES** GPS 26°33'19.00"N, 98°07'08.40"W (Elev. Approx.)**AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		(SC-SM) Silty Clayey Sand, Dark Brown, Very Loose, Dry	SPT 1		1-1-2 (3)			7	22	16	6	
		(SC) Clayey Sand, Lean, Orange - Brown w/ Dark Brown Sections (Noted From 4.5 ft to 6 ft), Loose to Medium Dense, Dry	SPT 2		3-4-5 (9)			4				36
5			SPT 3		4-5-7 (12)			3				
		(SC) Clayey Sand, Lean, Light Brown, w/ Calcareous Nodules, Medium Dense, Dry	SPT 4		10-10-11 (21)			2	35	16	19	
10			SPT 5		8-10-14 (24)			2				47
		(SC) Clayey Sand, Lean, Light Brown, w/ Calcareous Nodules, Dense to Very Dense, Dry	SPT 6		11-18-25 (43)			6	40	28	12	
15			SPT 7		50/3"			10				44
20			SPT 8		50/5"			6	30	21	9	61
25		(CL) Sandy Lean Clay, Light Brown, Hard, Dry										

Bottom of borehole at 25.0 feet.

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 1/2/14 15:15 - L:\GINT\PROJECTS\HID CO PCT 4 - EMERGENCY SERVICES FACILITY.GPJ

**L&G Engineering Laboratory**Construction Material Testing
Geotechnical EngineeringL&G Engineering Laboratory LLC
2100 W. Expressway 83
Mercedes TX 78570
Telephone: 956-565-0760**BORING NUMBER P-1**

PAGE 1 OF 1

CLIENT Hidalgo County Pct. 4**PROJECT NAME** Emergency Services Facility**PROJECT NUMBER** GL13032**PROJECT LOCATION** Hidalgo County**DATE STARTED** 12/10/13 **COMPLETED** 12/10/13**GROUND ELEVATION** 72 ft **HOLE SIZE** 4 inches**DRILLING CONTRACTOR** L&G Engineering Laboratory**GROUND WATER LEVELS:****DRILLING METHOD** Solid Stem Auger**AT TIME OF DRILLING** --- No Water Strike Encountered**LOGGED BY** R. Cantu **CHECKED BY** D. Saenz, P.E.**AT END OF DRILLING** ---**NOTES** GPS 26°33'20.60"N, 98°07'08.48"W (Elev. Approx.)**AFTER DRILLING** ---

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 1/2/14 15:15 - L:\GINT\PROJECTS\HID CO PCT 4 - EMERGENCY SERVICES FACILITY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		(SC) Clayey Sand, Lean, Dark Brown, w/ Traces of Small Roots, Very Loose to Loose, Dry	SPT 1		2-2-4 (6)			7				30
			SPT 2		3-2-2 (4)			5	24	16	8	
5			SPT 3		3-2-2 (4)			5				32
		(SC) Clayey Sand, Lean, Light Brown, w/ Calcareous Nodules, Loose, Dry	SPT 4		3-3-5 (8)			6	30	15	15	35
		(SC) Clayey Sand, Lean, Brown, w/ Calcareous Nodules, Medium Dense, Dry	SH 5			4.5		8	45	21	24	49
10												

Bottom of borehole at 10.0 feet.

**L&G Engineering Laboratory**Construction Material Testing
Geotechnical EngineeringL&G Engineering Laboratory LLC
2100 W. Expressway 83
Mercedes TX 78570
Telephone: 956-565-0760**BORING NUMBER P-2**

PAGE 1 OF 1

CLIENT Hidalgo County Pct. 4**PROJECT NAME** Emergency Services Facility**PROJECT NUMBER** GL13032**PROJECT LOCATION** Hidalgo County**DATE STARTED** 12/10/13 **COMPLETED** 12/10/13**GROUND ELEVATION** 74 ft **HOLE SIZE** 4 inches**DRILLING CONTRACTOR** L&G Engineering Laboratory**GROUND WATER LEVELS:****DRILLING METHOD** Solid Stem Auger**AT TIME OF DRILLING** --- No Water Strike Encountered**LOGGED BY** R. Cantu **CHECKED BY** D. Saenz, P.E.**AT END OF DRILLING** ---**NOTES** GPS 26°33'18.00"N, 98°07'08.40"W (Elev. Approx.)**AFTER DRILLING** ---

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 1/2/14 15:15 - L:\GINT\PROJECTS\HID CO PCT 4 - EMERGENCY SERVICES FACILITY.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0												
		(SC) Clayey Sand, Lean, Dark Brown w/ Light Brown Sections, w/ Traces of Small Roots, Very Loose to Loose, Dry	SPT 1		1-2-2 (4)			5	24	16	8	
			SPT 2		2-2-2 (4)			5				34
5			SPT 3		2-2-3 (5)			7	24	16	8	
		(SC) Clayey Sand, Lean, Light Tannish Brown, w/ Calcareous Nodules, Medium Dense, Dry	SPT 4		4-5-7 (12)			6				42
			SPT 5		7-8-11 (19)			5	40	18	22	50
10												

Bottom of borehole at 10.0 feet.

APPENDIX C – POTENTIAL VERTICAL RISE

Project: Hidalgo Co. Pct.4 - Emergency Services Facility
 Number: GL13032
 Boring: Proposed Building
 Date: 12/20/13
 Engineer: Jordan B. Sinclair, E.I.T.

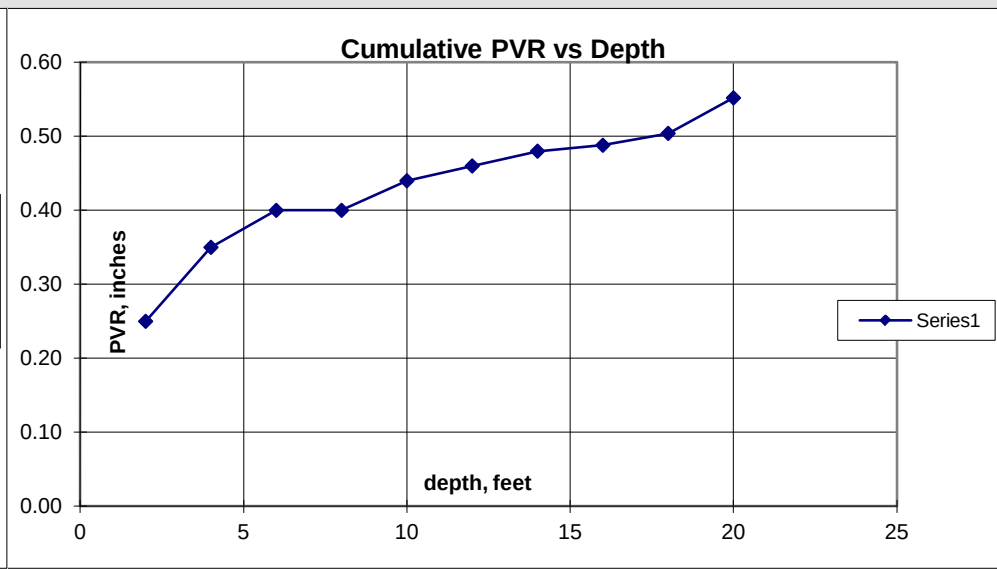
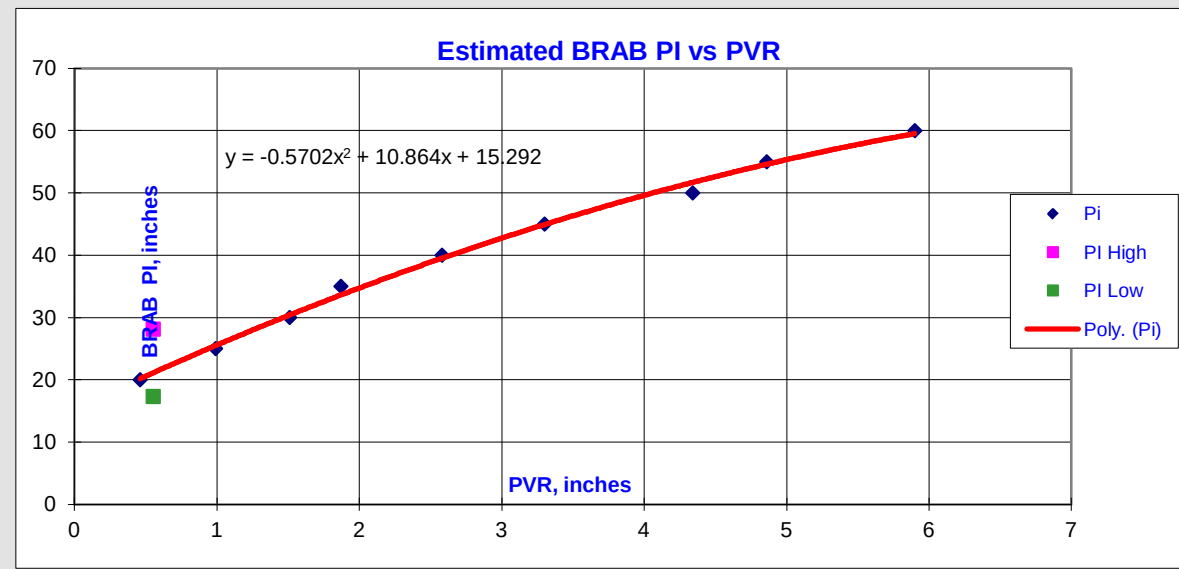
Existing in-situ soil has a PVR of approximately 0.6 inches at this location.



L & G Engineering Laboratory
 Construction Material Testing
 Geotechnical Engineering

Additional Surcharge 0 psi
 Wet Density 125 pcf

Layer	Top	Bottom	PI	Load Top	Load Bottom	Average Load, psi	Moisture content	Minus No. 40	Free Swell	Top of Layer	Bottom of Layer	Differenti al PVR	PVR in Layer	Cumulative PVR
1	0	2	12	0	2	1	dry	100%	5.0	0.00	0.25	0.25	0.25	0.25
2	2	4	12	2	4	3	dry	100%	5.0	0.25	0.35	0.10	0.10	0.35
3	4	6	14	4	6	5	dry	100%	5.0	0.35	0.40	0.05	0.05	0.40
4	6	8	14	6	8	7	dry	100%	5.0	0.40	0.40	0.00	0.00	0.40
5	8	10	16	8	10	9	dry	100%	6.0	0.66	0.70	0.04	0.04	0.44
6	10	12	16	10	12	11	dry	100%	6.0	0.70	0.72	0.02	0.02	0.46
7	12	14	16	12	14	13	dry	100%	6.0	0.72	0.74	0.02	0.02	0.48
8	14	16	23	14	16	15	dry	100%	9.0	1.76	1.77	0.01	0.01	0.49
9	16	18	23	16	18	17	dry	100%	9.0	1.77	1.78	0.02	0.02	0.50
10	18	20	23	18	20	19	dry	100%	9.0	1.78	1.83	0.05	0.05	0.55



PVR 0.6
Equivalent BRAB PI
14

Project: Hidalgo Co. Pct.4 - Emergency Services Facility
 Number: GL13032
 Boring: Proposed Building
 Date: 12/20/13
 Engineer: Jordan B. Sinclair, E.I.T.

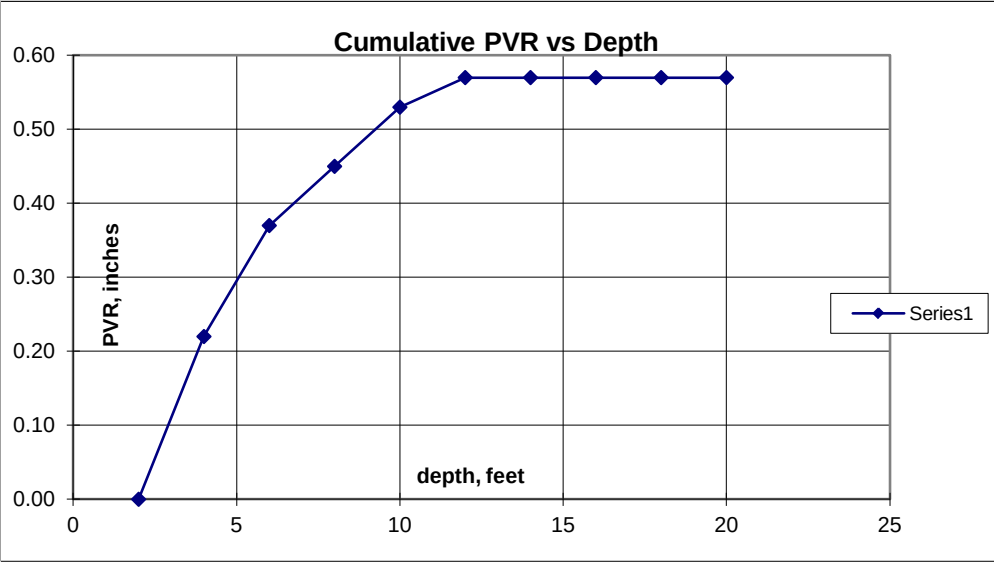
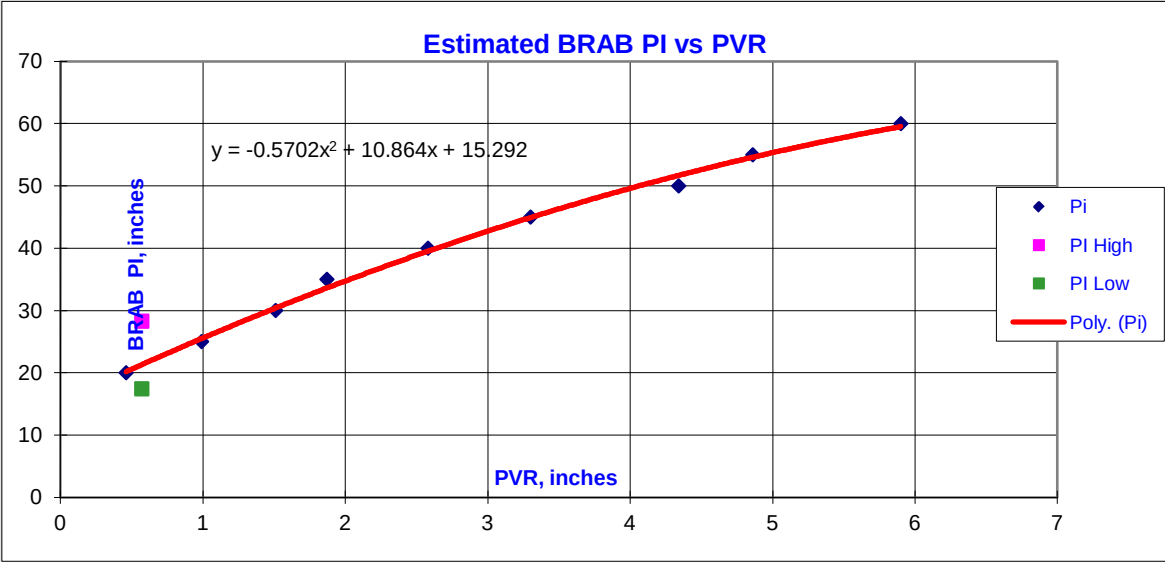
Existing in-situ soil has a PVR of approximately 0.6 inches at this location.



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 Construction Material Testing
 Geotechnical Engineering

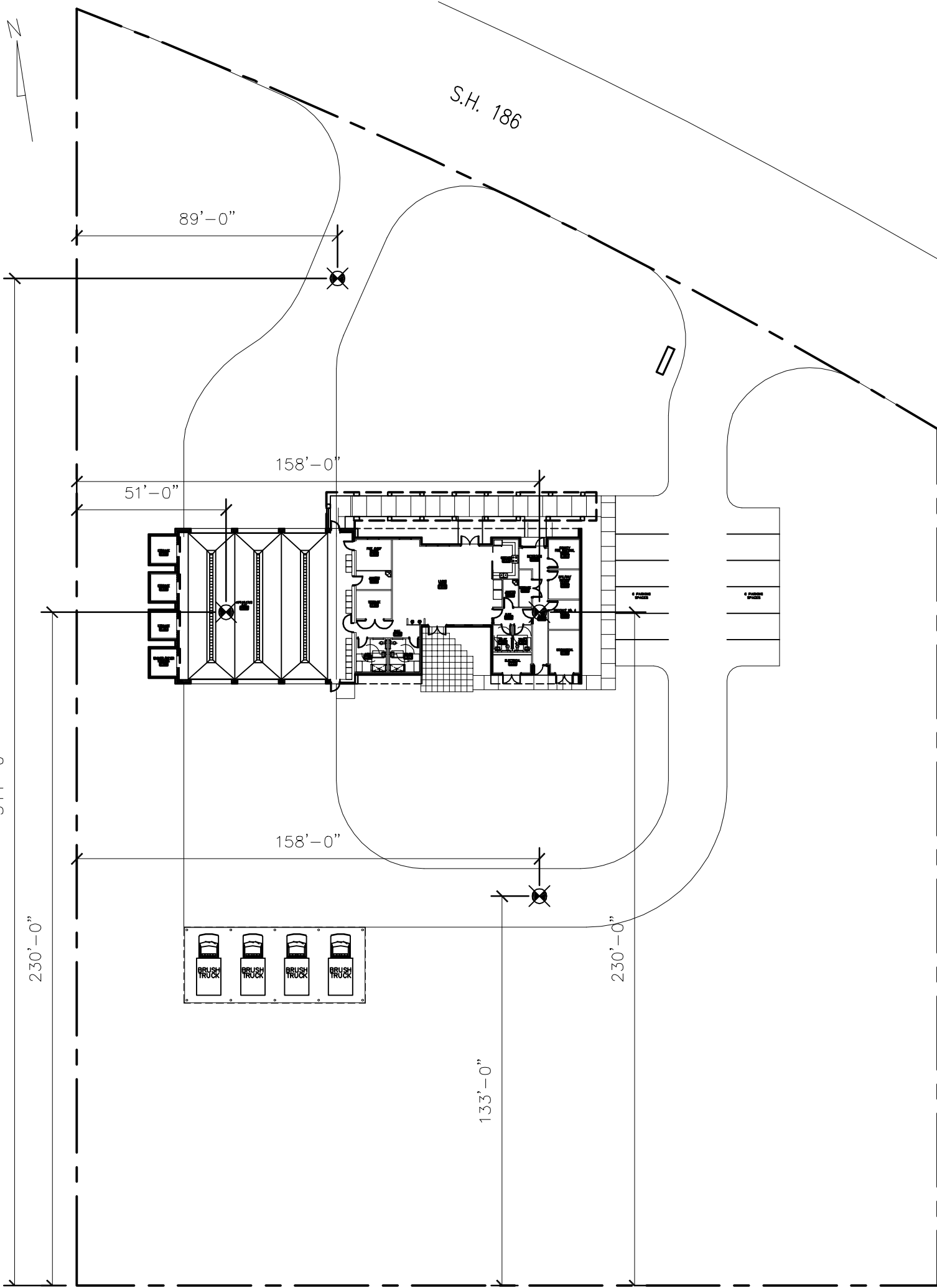
Additional Surcharge 0 psi
 Wet Density 125 pcf

Layer	Top	Bottom	PI	Load Top	Load Bottom	Average Load, psi	Moisture content	Minus No. 40	Free Swell	Top of Layer	Bottom of Layer	Differential PVR	PVR in Layer	Cumulative PVR
1	0	2	6	0	2	1	dry	100%	0.0	0.00	0.00	0.00	0.00	0.00
2	2	4	19	2	4	3	dry	100%	7.0	0.47	0.69	0.22	0.22	0.22
3	4	6	19	4	6	5	dry	100%	7.0	0.69	0.84	0.15	0.15	0.37
4	6	8	19	6	8	7	dry	100%	7.0	0.84	0.92	0.08	0.08	0.45
5	8	10	19	8	10	9	dry	100%	7.0	0.92	1.00	0.08	0.08	0.53
6	10	12	19	10	12	11	dry	100%	7.0	1.00	1.04	0.04	0.04	0.57
7	12	14	12	12	14	13	dry	100%	5.0	0.40	0.40	0.00	0.00	0.57
8	14	16	12	14	16	15	dry	100%	5.0	0.40	0.40	0.00	0.00	0.57
9	16	18	12	16	18	17	dry	100%	5.0	0.40	0.40	0.00	0.00	0.57
10	18	20	12	18	20	19	dry	100%	5.0	0.40	0.40	0.00	0.00	0.57



PVR 0.6
Equivalent BRAB PI
16

APPENDIX D – PLANS & SPECS (PROVIDED BY CLIENT)



SECTION 00300

BID FORM

PROJECT: 2014-067-04-02-MSS-Hidalgo County Precinct No. 4 "Construction of the Linn – San Manuel Emergency Services Facility

PLACE: Hidalgo County Purchasing Department, Hidalgo County New Administration Building, 2802 South Business Hwy. 281, (Southeast of Canton Road and Business 281), Edinburg, Texas.

DATE: April 2, 2014

TIME: 3:00 PM

TO: Martha L. Salazar, CPPB, Hidalgo County Purchasing Agent, Hidalgo County Purchasing Department

1. Pursuant to and in compliance with the Invitation for Bid and the proposed contract documents dated February 27, 2014; Mata+Garcia Architects LLP to the above referenced project, the undersigned hereby proposes and agrees to fully perform the work within the time stated and in strict accordance with the proposed Contract Documents, and addenda thereto, for the following sum of money:

- A. BASE BID: New Emergency Services Facility: All labor, materials, services, and equipment necessary for the work shown on the drawings and specifications, (Contract Documents), by the date set forth by the general contractor as the completion date of the project.

_____ DOLLARS(\$_____)

- B. Alternate No. 1 – Generator: All labor, materials, services, and equipment necessary for the work shown on the drawings and specifications, (Contract Documents), add the following amount:

_____ DOLLARS(\$_____)

- C. Alternate No. 2 – Asphalt and Concrete Driveways and Parking as per Civil Engineering Drawings: All labor, materials, services, and equipment necessary for the work shown on the drawings and specifications, (Contract Documents), deduct the following amount:

_____ DOLLARS(\$_____)

2. If awarded this contract, the undersigned will execute a satisfactory Construction Contract, Performance Bond, Labor and Material Payment Bond and Proof of Insurance coverage, with the Owner for the entire work as per the Contract Documents within ten (10) days after the Notice of Award. It is agreed that his proposal is subjected to the owner's acceptance for a period of thirty (30) days from the above date.

3. Enclosed is a Certificate Check or Bidders Bond in the amount of \$_____ in compliance with the specifications requirements. (5% of highest amount proposed.) The above check or Bidders Bond is to become the property of the Owner in the event the Construction Contract (when offered by the Owner) and the bonds and proof of insurance are not within the time set forth above.
4. Extra Work:
The undersigned agrees that should any change in the work or extra work be ordered, the allowance for overhead and profit contained shall be as scheduled below, but in no case shall it exceed 15%. The following applicable percentages shall be added to the extra work cost as defined by Article 12 of the General Conditions.
- A. Allowance to the Contractor for overhead and profit for extra work provided by his own forces _____%
- B. Allowance to the Contractor for overhead and profit for extra work provided by a subcontractor and supervised by the contractor _____%
5. The undersigned agrees to the following:
- A. To furnish all labor and materials as shown and specified.
- B. To complete the base bid including anticipated delay days due to inclement weather or muddy ground conditions in _____ calendar days.(Completion date as set by General Contractor.)
- C. To work _____ days per week.
- D. To start work _____ days after notice of award of contract.
6. Receipt is acknowledged of the following addends:
- No. _____ Date: _____
- No. _____ Date: _____
7. The Bidder attests and affirms that he and his subcontractors are skilled experienced in the use and interpretation of plans, specifications addenda, and related bid documents and has found them to be free of conflict and/or ambiguities and sufficient for bidding and construction purposes. Further, he has carefully examined the soils repairs and the site of the work, and through his own personal observations has satisfied himself as to the nature, location and requirement of the work; the character, quality and quantity of materials required; the difficulties likely to be encountered; the other items and/or conditions which may affect the satisfactory performance of the work. He has based his proposal solely on these documents and personal observation and has not relied in any way explanation or interpretation and or written from any source other than those written and issued by the Architect/Engineer.
8. The Bidder agrees that the owner has the right to accept or reject any or all bids and to waive all informalities.
9. The undersigned bidder, by signing and executing this bid, certifies and represents to the County of Hidalgo that Bidder has not offered, conferred or agreed to confer any pecuniary benefits, as defined by TEX. PENAL CODE ANN. S218, or any other thing or value, as consideration for the receipt of information or any specs treatment or advantage relating to this proposal; the Bidder also certifies, and presents, that the Bidder has not offered, conferred or agreed to confer any penicuniary benefit or other thing conferred of value as consideration not authorized by the law, the Bidder also certifies and represents that proposer has not received any information not available to other Bidders so as to give the undersigned a preferential advantage with respect to this bid; the Bidder further certifies and represents that Bidder has not violated any state, federal or local law, regulation or ordinance relating to bribery, improper influence, collusion or that the Bidder will not, in the future, offer, confer, or agree to confer any pecuniary benefit or other thing of value to any officer, trustee, agent, or employee of the County of Hidalgo in return for the person having exercised the person's official discretion, power or duty with respect to this proposal, the Bidder certifies and represents that is has now, and will not in the future, offer, confer, or agree to confer a

pecuniary benefit or other thing of value of any officer, trustee, agent, or employee of the County of Hidalgo in connection with information regarding this bid; the submission of this bid, the award of this bid or the performance, delivery or sale pursuant to this bid.

Respectfully submitted;

Proposer _____ Signed by: _____
Name of Firm

Address _____ Name: _____

_____ Title: _____

_____ Date: _____

Phone No: _____ Fax No: _____

(Seal if bidder is a corporation.)

END OF SECTION

SECTION 00400

SUPPLEMENTS TO BID FORMS

BID SECURITY

Each bid must be accompanied by Bid Security in the amount of 5% of the largest possible data of the bid submitted.

The Bid Security may be by cash, certified check or a Bid Bond. The Bid Bond must be executed by the bidder as principal. The Bid Bond form and Security Company are subject to approval by the Owner and the Surety must comply with requirements noted in the General Conditions.

The bid securities will be returned promptly after the Owner and the accepted bidder have executed the Contract, or, if no award has been made within ninety (90) days after the date of the opening of bids, upon demand of the bidder anytime thereafter so long as he has not been notified of the acceptance of his bid.

END OF SECTION

SECTION 00500

AGREEMENT FORM

Agreement (Stipulated Price)

The Agreement will be executed on AIA Document Number A-101 "Standard Form of Agreement between Owner and Contractor", 2007 edition. A sample of this form is attached to the County of Hidalgo "Front End Documents".

END OF SECTION

SECTION 00600

BONDS AND CERTIFICATES

The Contractor shall furnish the following Bonds and Certificates to be delivered simultaneously with the executed contract:

- a. Performance Bond
- b. Labor and Materials Payment Bond
- c. Certificates of Insurance-Provide on AIA document G-705

The Performance, Labor and Materials Bond shall be provided on Bonds which comply with Article 5160 of the revised Civil Statutes of the state of Texas as amended by the Acts of the 64th Legislature 1975 and acts of the 65th Legislature, 1977.

The surety on such bonds shall be a surety company satisfactory to the Owner. See Article 7 of the Supplementary Condition.

Costs of the above stated bonds and insurance are to be included in the bid.

Attorneys-in-Fact who sign bonds must file with each bond a certified and effective dated copy of their Power of Attorney.

The Performance Bond shall guarantee the repair and maintenance of all defects due to faulty materials and workmanship that appear within one (1) year from date of substantial completion.

AIA Document A310-Bid Bond,
AIA Document A101 / Standard form of agreement between
Owner and Contractor 2007
Performance Bond, AIA Document A312
"Payment Bond"

AIA Document A201 General Conditions of the Contract for Construction 2007

Refer to the County Of Hidalgo "Front End Documents" for additional information.

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART I GENERAL

1.01 SECTION INCLUDES

- A. Contractor use of site.
- B. Work Sequence.
- C. Owner occupancy.

1.02 CONTRACTOR USE OF SITE

- A. Limit use of site to allow:
 - 1. Owner occupancy. (County crews working on grading for adjacent park.)
 - 2. Work by Others and Works by Owner (A separate request for bid contract will be issued for construction work on amenities for the adjacent Sunflower Park.)
- B. Construction Operations: Limited to areas noted on Drawings. (To be reviewed at Pre-Bid Meeting on Monday, March 24, 2014 at 3:00 P.M. at Hidalgo County Purchasing Department Conference Room, 2812 Business Hwy. 281, Edinburg, Texas, 75839.
- C. Construction Operations outside of limits of construction shall be coordinated with Owner to minimize impact to Owner operations.
- D. Utility Outrages and Shutdown: Coordination with Owner to avoid disruption of Owner's activities.

1.03 WORK SEQUENCE

- A. Construct work in phases to accommodate Owner's occupancy requirements during the construction period, coordinate construction schedule and operations with such that all work outside of the limits of construction is scheduled to occur at times areas are not required for Owner operations.

1.04 OWNER OCCUPANCY

- A. The Owner intends to occupy the entire campus area outside the limits of Construction.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operation.
- C. Scheduled the work to accommodate this requirement.

END OF SECTION

SECTION 01020

ALLOWANCES

PART I GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Each specification section listed in paragraph 1.04 of this section

1.02 CONTINGENCY ALLOWANCE

- A. Use moneys in Contingency Allowance only on issuance of written directive by the architect.
- B. Include in bid for inclusion in contract sum, Contingency Allowance of \$10,000.00 (Ten Thousand Dollars.)
- C. The contractor's base bid shall include overhead, profit, insurance and taxes for the Contingency Allowance. Contingency Allowance request shall include the following costs: (1) Products (2) Labor (3) Transportation (4) Equipment rental (5) other direct expenses.
- D. Money remaining in allowance at the close of the project, is to be credited to Owner by Change Order, or transferred to other allowances as directed by Architect.

1.03 ALLOWANCE FOR PRODUCT USE

- A. Purchase products under each Allowance as directed by the Architect.
- B. Include the following amounts in bid, for inclusion in contract sum:
 - 1. Section 10400 Identifying Devices (Interior Room Signage): Allow lump sum of \$2,000.00 (Two Thousand and no/100 Dollars).
 - 2. Landscaping Allowance: Allow lump sum of \$25,000.00 (Twenty-five Thousand and no/100 Dollars.) Breakdown: \$20,000.00 for landscaping and \$5,000.00 for Irrigation.
- C. Amount of Allowances includes:
 - 1. Net cost of product
 - 2. Delivery and unloading at site
 - 3. Applicable taxes
- D. In addition to amounts of allowances, include in bid, for inclusion in contract sum, contractors' cost for: (1) Handling at site, including uncrating and storage (2) Protection from damage from elements (3) Labor, installation and finishing (4) Other expenses required to complete installation (5) Contractors' overhead, profit and insurance.
- E. Money remaining in allowance at close of project, credited to Owner by Change Order, or to other allowances as directed by Architect.

1.04 SELECTION OF PRODUCTS

- A. Architect's duties:
 - 1. Consult with contractors in consideration of products and supplies to be used.
 - 2. Make selection, designate products to be used.
 - 3. Make recommendations for consideration by Owner.
 - 4. Notify Owner of any effect anticipated by selection of product or supplier under supplier consideration:
 - a. Construction schedule.
 - b. Contract sum.
 - 5. On notice of approval, enter Purchase Agreement with designated supplier.

1.05 DELIVERY

- A. Contractor's responsibility:
 - 1. Arrange for delivery and unloading.
 - 2. Promptly inspect products for damage or defects.
 - 3. Submit claims for transportation damage.

1.06 INSTALLATION

- A. Do not exceed allowance without Architect's approval.
- B. Should actual approved purchase cost be more or less than specified amount of allowance, contract sum will be adjusted by change order equal to amount of difference.
- C. For Products specified under unit other data to substantiate quantity actually used.

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART I GENERAL

1.01 SECTION INCULDES

- A. Procedures for preparation and submittal of Application for Payment from Contractor to the Architect.
- B. Schedule of Values.

1.02 RELATED SECTIONS

- A. Section 01300-Submittal procedures.
- B. Section 01700-Contract Closeout: Final Payment.

1.03 FORMAT

- A. AIA G702-Application and Certificate for Payment including continuation sheets when required, for submission to the Architect.
- B. AIA G722 and G723-Project Application and project certificate for payment and project application summary for submission to the architect.
- C. For each item, provide a column for listing: Item Number; Description of Work; Scheduled Value, Previous Applications: Authorized Change Orders; Total Completed and Stored to Date of Application; Percentage of Completion; Balance to Finish; and Retainage.

1.04 SCHEDULED OF VALUES

- A. Present required information of AIA G702 for scheduled of values in typewritten form or on electronic media printout.
- B. Submit Schedule of Values itemizing work on contract drawings and itemizing work of each specification section and products found within.
- C. Further breakout all significant products or components of contract work with the total value broken into material and labor categories. Organize categories in similar order to specifications.
- D. Specifically show values for all work required in Specifications Section 01700.
- E. Specifically show values for all allowances.
- F. Schedule of value shall be approved prior to first application for payment

1.05 PREPARATION OF APPLICATIONS

- A. Present required information in typewritten form or on electronic media printout.
- B. Executed certification by signature of authorized officer.
- C. Use data from approved Scheduled of Values. Provide dollar value in each column for each item for portion of work performed and for stored products.
- D. List each authorized Change Order as an extension on continuation sheet, listing Change Order numbered and dollar amount as for an original item of work.
- E. Prepare Application for Final Payment as specified in Section 01700.

1.06 SUBMITTAL PROCEDURES

- A. Submit four copies of each Application for Payment (Form G702).
- B. Submit an updated construction scheduled with each Application for Payment.
- C. Submit under transmittal letter specified in Section 01300.
- D. General Contractor will submit Form G722 and G723 to Architect.

1.07 SUBSTANTIATING DATA

- A. When Architect requires substantiating information, submit data justifying dollar amounts in question.
- B. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

END OF SECTION

SECTION 01028

CHANGE ORDER PROCEDURES

PART I GENERAL

1.01 SECTION INCLUDES

- A. Submittals
- B. Documentation of change in Contract Sum/Price and Contract Time.
- C. Change Procedures
- D. Construction Change Authorization
- E. Agreed Lump Sum Change Order
- F. Agreed Unit Price Change Order
- G. Field Cost of Plus Change Order
- H. Execution of Change of Contractor Submittals.

1.02 RELATED SECTIONS

- A. Section 01027-Applications for Payment: Payment applications.
- B. Section 01300-Submittals: Work schedule
- C. Section 01600-Materials and Equipment: Product options and substitutions.
- D. Section 01700-Contract Close out: Project Record Documents.

1.03 SUBMITTALS

- A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's empty or Subcontractors of change to the Work.
- B. Change Order Forms: AIA G701/CM Change Order.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done. Provide full information required for evaluation of proposed changes and to substantiate costs of changes in the Work.
- B. Document each quotation for a change in cost or time with sufficient data allow evaluation of the quotation.
- C. On request, provide additional data to support computations:
 - 1. Quantities of products, labor and equipment
 - 2. Taxes, insurance and bonds.
 - 3. Overhead and profit
 - 4. Justification for any change in Contract Time.
 - 5. Credit for deletions from Contract Time.
- D. Support each claim for additional costs, and for work done on an actual field cost plus basis, with additional information:
 - 1. Origin and date of claim.
 - 2. Dates and times work was performed, and by whom.
 - 3. Time records and wages rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontractors, similarly documented.

1.05 CHANGE PROCEDURES

- A. The Architect will advise of minor change in the Work not involving an adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on AIA Form G710
- B. The Architect may issue a Proposal Request, which includes a detailed description of a proposed change with supplementary or revised drawings and specifications. The General Contractor will prepare and submit a cost proposal within 20 days.

1.06 CONSTRUCTION CHANGE AUTHORIZATION

- A. Architect may issue a document, signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
- B. The document will describe changes in the Work, and for subsequent inclusion in a Change in the Work, and will designate method of determining any change in Contract Sum/Price or Contract Time.
- C. Promptly execute the change in Work.

1.07 GREED LUMP SUM CHANGE ORDER

- A. For general construction work, the contractor will submit a breakdown consistent with his pay estimate breakdown, detailed with estimate quantities for both labor and materials. The contractor will be allowed the actual cost of materials, labor, payroll taxes and insurance, builder's risk insurance, bond and other itemized direct job site expenses as previously approved by the Owner. If the scope of construction is reduced by the Owner such as such that the general contractor will not incur cost for the deleted work, the general contractor will not credit those costs to the Owner, and retain only his overhead and profit. If extra work is requested by the Owner, the general contractor will be allowed to add to his actual costs a percentage as noted in paragraphs B and C below to cover his overhead and profit.

- B. Actual Cost of work \$500 or More:

Allowable mark-up percentage for overhead and profit will be 20 percent on the first \$10,000, 15 percent on the next \$10,000, and 10 percent on the balance over \$20,000.

If subcontracted work is involved, the general contractor will include with this proposal a detailed breakdown for the subcontractor in accordance with the above requirements for the general contractor. The subcontractor will be allowed the same mark-up percentages as provided for the general contractor.

The general contractor will be allowed the following mark-up on subcontracted work: a maximum of 10 percent on the first \$30,000, 7-1/2 percent on the next \$30,000, and 5 percent on the balance over \$60,000.

- C. Actual Cost of Work Less Than \$500:

Overhead and profit mark-up for extra work with an actual cost of less than \$500 shall be negotiated. The contractor shall present to the Owner itemized evidence of reasonable expenditures and efforts necessitated by the changes in scope of work.

Payments of change orders in amounts less than \$500 shall be deferred until one of the following conditions occur: (1) subsequent change orders increase accumulative total of \$500 or more, or (2) ninety days expire after acceptance of the change order, or (3) final payment is made for the completion of work that has a period of less than 90 days.

1.08 NEGOTIATED COST

- A. The contractor upon receipt of a written order signed by the Owner shall promptly proceed with the work involved. The cost of such work shall than be determined by the Architect on the basis or reasonable expenditures and savings of those performing the work attributable to the change, including, in the case on increase in the Contract Sum, a reasonable allowance experimenters and savings of those performing the work attributable to the change, including, in the case on increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, the contractor shall keep and present, in such form as the architect may prescribed, and itemized accounting together with appropriate supporting data for inclusion in a change order. Unless otherwise provided in the Contract in a change order. Unless otherwise provided in the Contract Documents, cost shall be limited to the following: cost of materials, and cost of delivery; cost of labor, including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; worker's or workmen's compensation insurance; bond premiums; rental value of equipment and machinery; and the additional costs of supervision and field personnel directly attributable to the change.

1.09 EXECUTION OF CHANGE ORDERS

- A. Execution of Change of Orders: Architect will issue Change Orders for signatures of parties as provided in the Condition of the Contract.

1.10 CORRELATION OF CONTRACTORS SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- B. Promptly revise progress schedules to adjust time for other items of work affected by the change, and resubmit.
- C. Promptly enter change in Project Record Documents.

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART I GENERAL

1.01 SECTION INCLUDES

- A. Coordination.
- B. Field engineering.
- C. Alteration project procedures.
- D. Cutting and patching.
- E. Pre-construction conference.
- F. Progress meeting.
- G. Pre-installation conferences.
- H. Scheduling.

1.02 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work with various section, having, interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work, which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.03 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Texas and acceptable to the Owner.
- B. Contractor to locate and protect survey control and reference points.
- C. Control datum for survey is that established by Owner provided survey and as shown on Drawings.
- D. Provide field engineering services. Establish elevations, lines and levels, utilizing recognized engineering survey practices.

1.04 ALTERATION PROJECT PROCEDURES

- A. Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- C. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finishes to specified conditions.
- D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.

- E. Where new work abuts or aligns with existing, perform a smooth and even transition. Patch work to match existing adjacent work in texture and appearance.
- F. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
- G. Where change of plane of V4 inch or more occurs, submit recommendation for providing a smooth transition for Architect review.
- H. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfection.
- I. Finish surfaces as specified in individual product sections.

1.05 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements which affects:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner of separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover work to install or correct ill-timed work.
 - 3. Remove and replace defective and non-conforming work.
 - 4. Remove samples of installed Work for testing.
 - 5. Provide openings in elements of Work for penetrations of mechanical and electrical work.
- D. Execute work by methods that will avoid damage to other Work, and provide proper surfaces to receive patching and finishing.
- E. Cut rigid materials using masonry saw or core drill.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
- J. Identify any hazardous substance or condition exposed during the Work to the Architect for decision or remedy.

1.06 PRE-CONSTRUCTION CONFERENCE

- A. Architect will schedule a meeting after Notice to Proceed.
- B. Attendance Required: Owner, Architect, Engineers, Contractor, and major Sub-contractors.
- C. Agenda:
 - 1. Submission of executed bonds and insurance certificates.
 - 2. Distribution of Contract Documents.
 - 3. Submissions of list of Sub-Contractors, list of products, schedule of values, and progress schedule.
 - 4. Designation of personnel representing the parties in Contract, and the Architect.
 - 5. Procedures and processing of field decisions, submittals substitutions, applications for payments, proposal request, Change Orders, and contract closeout procedures.
 - 6. Scheduling.

1.07 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within seven days to Architect, Owner, participants, and those affected by decisions made.
- C. Attendance Required: Job superintendent, major Sub-contractors and suppliers, owner, architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Review of Application For Payment.
 - 14. Other business relating to Work.

1.08 PRE-INSTALLATION CONFERENCES

- A. When required in individual specification section, convene a pre-installation meeting at work site prior to commencing work of the Section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific Section.
- C. Notify Architect seven days in advance of meeting date.
- D. Prepare agenda, preside at conference, record minutes, and distribute copies within two days after conference to participants, with two copies to Architect.
- E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

1.09 SCHEDULING

- A. The General Contractor will produce an overall project schedule.
- B. Bid Package contractors and suppliers will provide individual work schedule data and input to the construction Manager.

END OF SECTION

SECTION 01040

CONTRACT COORDINATION

PART I GENERAL

1.01 SECTION INCLUDES

- A. Coordination of work of contract.

1.02 RELATED REQUIREMENTS

- A. Section 01005-Administrative Provisions.
- B. Section 00145-Cutting and patching.

1.03 DESCRIPTION

- A. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

1.04 MEETINGS

- A. In addition to progress meetings specified in Section 01005, hold coordination meetings and pre-installation conferences with personnel and subcontractors to assure coordination of work.

1.05 COORDINATIONS OF SUBMITTALS

- A. Schedule and coordinate submittals specified in section 01300.
- B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and affect of work of other sections.

1.06 COORDINATION OF SPACE

- A. Coordinate use of project space and sequence of installation of mechanical, electrical and plumbing work that is indicated diagrammatically on drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance or available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- B. In finish areas conceal pipes, ducts and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.07 COORDINATION OF CONTRACT CLOSEOUT

- A. Coordinate completion and clean up of work separate sections in preparation for substantial completion.
- B. After owner occupancy of premises, coordinate access to site by various sections for correction of defective work not in accordance with contract documents, to minimize disruption of owner's activities.
- C. Assemble and coordinate closeout submittals specified in Section 01700.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART I GENERAL

1.01 REQUIREMENTS INCLUDE

- A. Contractor shall be responsible for all cutting, fitting and patching, including attendant excavation and back fill, required to complete the work or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the work to provide for installation of ill-times work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of contract documents.
 - 5. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

1.02 SUBMITTALS

- A. Submit a written request to Architect/Engineer well in advance of executing and cutting or alteration which effects:
 - 1. Work of the owner or any separate contractor.
 - 2. Structural value or integrity of any element of the project.
 - 3. Integrity or effectiveness of weather-exposed or moisture resistant elements or systems.
 - 4. Efficiency, operational life, maintenance or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.
- B. Request shall include:
 - 1. Identification of the project.
 - 2. Description of the affected work.
 - 3. The necessity for cutting, alteration or excavation.
 - 4. Effect on work of owner or any separate contractor, or on structural or weatherproof integrity of project.
 - 5. Description of proposed work:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades who will execute work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 - 6. Alternatives to cutting, when applicable.
 - 7. Cost proposal, when applicable.
- C. Should conditions of the work or the schedule indicate a change of products from original installation, contractor shall submit request for substitution.
- D. Submit written notice to Architect/Engineer designating the date and the time the work will be uncovered.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering of work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Architect/Engineer in writing; do not proceed with work until Architect/Engineer has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of project from damage.
- C. Provide protection from elements for that portion of the project that may be exposed by cutting and patching work, and maintain excavations free from water.

3.03 PERFORMANCE

- A. Execute cutting and demolition by methods that will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Employ original installer or fabricator to perform cutting and patching for:
 - 1. Weather-exposed or moisture resistant elements.
 - 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finish.
- E. Restore work that has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes;
 - 1. For continuous surfaces, refinish to nearest intersection.
 - 2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART I GENERAL

1.01 DESCRIPTION

- A. Work included: Provide and pay for field engineering services required for project.
 - 1. Survey work required herein.
 - 2. Other professional engineering services required to execute Contractor's construction methods.
- B. Related Work Described Elsewhere:
 - 1. Earthwork Section 02200
 - 2. Concrete Footings Section 02300
 - 3. Concrete Walks Section 02510
 - 4. Asphaltic Concrete Paving Section 02513
 - 5. Portland Cement Concrete Paving Section 02515
 - 6. Concrete Curbs and Gutters Section 02528

1.02 QUALIFICATIONS OF SURVEYOR

- A. Qualified land surveyor registered in state in which project is located.
- B. Approved in writing by Architect.

1.03 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for project are those designated on the drawings.
- B. Location: Verify and protect control points (bench marks) prior to beginning work and preserve permanent reference points during construction.

1.04 PROJECT SURVEY REQUIREMENTS

- A. Establish minimum of two (2) permanent bench marks on site, referenced to survey control points. Record locations, with horizontal and vertical data, on the Project Record Documents as per Section 01720.
- B. Establish lines and levels, locate and layout, by instrumentation.
 - 1. Site improvements:
 - a. Stakes for grading, fill and topsoil replacement.
 - b. Utility lines slopes and invert elevations.
 - c. Pavement and curb elevation for all driveways and parking areas.
 - 2. Batter board for structures.
 - 3. Building foundations, column locations and floor elevations.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
- C. Establish all external corner locations for structures at same time. Verify setbacks and distances to property lines with information given on drawings.
- D. Promptly notify architect of any errors or discrepancies encountered; await interpretation prior to proceeding with work.

1.05 RECORDS

- A. Maintain complete, accurate log of all control points and survey work as it progresses.

1.06 SUBMITTALS

- A. Submit documentation to verify accuracy of field engineering work upon Architects request.
- B. Submit certification signed by surveyor certifying that elevations and locations are in conformance, or non-conformance with the Contract Documents.

END OF SECTION
Section 01050-1

SECTION 01090

REFERENCE STANDARDS

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Applicability of reference standards.
- B. Provisions of reference standards at site.
- C. Acronyms used in contract documents for reference standards. Source of reference standard.

1.02 RELATED REQUIREMENTS

- A. General and supplementary conditions of the contract.

1.03 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Bid date, or date of Owner-contractor agreement when there are no bids, except when a specific date is specified.
- C. When required by individual specification section, obtain copy of standard. Maintain copy at job site during submittals, planning, and progress of the specific work, until substantial completion.

1.04 SCHEDULE OF REFERENCES

AA	Aluminum Association 818 Connecticut Avenue, N. W. Washington, DC 20006
AABC	Associated Air Balance Council 1000 Vermont Avenue, N. W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Redford Station Detroit, MI 48219
ADC	Air Diffusion Council 435 North Michigan Avenue Chicago, IL 60611
AGC	Associated General Contractors of America 1957 E> Street, N. W. Washington, DC 20006
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AITC	American Institute of Timber Construction 333 W> Hampden Avenue College Park, MD 20240

AISC	American Institute and Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16 th Street, N. W. Washington, DC 20036
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
APA	American Plywood Association Box 11700 Tacoma, WA 98411
ARI	Air Conditioning and Refrigeration Institute 1815 North Fort Myer Drive Arlington, VA 22209
ASHRAE	American Society of Heating, Refrigeration And Air Conditioning Engineers 345 East 47 th Street New York, NY 10017
ASME	American Society of Mechanical Engineers 345 East 47 th Street New York, NY 10017
ASPA	American Sod Producers Association Association Building Ninth and Minnesota Hastings, NE 68901
ASTM	American Society for Testing And Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 West Quincey Avenue Denver, Colorado 80235
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood-Preservers Association 7735 Old Georgetown Rd. Bethesda, MD 20014

AWS	American Welding Society 2501 NW 7 th Street Miami, FL 33125
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue, N.W. Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street Suite 2110 Chicago, IL 60601
EJMA	Expansion Joint Manufacturers Association 708 Westchester Avenue White Plains, NY 10604
FM	Factory Mutual System 1151 Boston-Providence Turnpike Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
GA	Gypsum Association 1603 Orrington Avenue Evanston, IL 60201
IEEE	Institute of Electrical and Electronics Engineers 345 East 47 th Street New York, NY 10017
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 823 15 th Street, N.W. Washington, DC 20005
NEBB	National Electrical Manufacturers' Association 8224 Old Courthouse Road Vienna, VA 22180
NEMA	National Electrical Manufacturer's Association 2101 L Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PS	Product Standard U.S. Department of Commerce Washington, DC 20203
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
TCA	Tile Council of America, Inc. Box 326 Princeton, NJ 08540
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

END OF SECTION

SECTION 01100

ALTERNATIVES

PART I GENERAL

1.01 DESCRIPTION

- A. Work included. Certain Alternates have been established as described herein. These are to allow the Owner to:
 - 1. Compare costs where alternate materials and methods may be used on the project.
 - 2. Make a decision concerning Alternate materials and methods prior to awarding the Contract.
- B. Related work described elsewhere.
 - 1. Pertinent Section of the Specifications described the materials and methods required under the Alternate.
 - 2. The method for stating the proposed Contract Sum is described on the Bid Form.

1.02 SUBMITTALS

- A. Indicate on the Bid Form a proposal for the Alternate.
- B. In no figure is indicated for the Alternate, the Alternate may be accepted at no change in Base Bid.
- C. Do not submit alternates other than those described in this section
- D. Do not submit statements qualifying alternates.

1.03 PRODUCT HANDLING

- A. If the Owner elects to accept the alternate(s), make all modifications required in furnishing and installing of the Alternate(s) to approval of Architect and at no Additional Cost other than proposed on Bid Form.

PART 2 PRODUCTS

2.01 ALTERNATE NO.1.

- A. Provide all labor, materials, equipment, etc. for providing and installing the Generator and all related accessories.

ALTERNATE NO.2.

- B. Provide all labor, materials, equipment, etc. for providing and installing the asphalt and concrete paving; as per the civil engineering drawings.

PART 3 EXECUTION

3.01 ADVANCE COORDINATION

- A. Immediately after award of Contract, advise necessary subcontractors and suppliers as to nature and extent of alternates, involved changes caused by Alternate Selection.

3.02 SURFACE CONDITIONS

- A. Prior to installation to alternate, verify that work has been modified as necessary to accept the installation and that items may be installed in complete accordance with their manufacturer's current recommendations; in the event of discrepancy, notify Architect and proceed as directed.

END OF SECTION

SECTION 01300

SUBMITTALS

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Procedures.
- B. Schedule of Values.
- C. Shop Drawings.
- D. Product Data. Samples.
- E. Manufacturer's Certificates.

1.02 RELATED REQUIREMENTS

- A. Section 01005-Administrative Provisions.
- B. Section 01600-Material and equipment: Manufacturers Instructions.

1.03 PROCEDURES

- A. Deliver submittals to Architect/Engineer at address listed on project manual.
- B. Transmit each item under AIA form 810. Identify Project Contractor, Subcontractor, Major Supplier, Identify pertinent drawing sheet and detail number, and specification section number, as appropriate. Identify deviations from Contract documents. Provide space for Contractor and Architect/Engineer review stamps. General Contractor to review submittals prior to submission and place signature on company review stamp.
- C. Submit Initial progress schedules in bar chart form showing start and completion of all trades or sections of the work and schedule of values in duplicate within 15 days after award of contract. After review by Architect/Engineer revise and resubmit as required. Submit revised schedules with each application for payment, reflecting changes since previous submittal. Progress schedules shall be updated monthly to show project status.
- D. Comply with progress schedule for submittals related to work progress. Coordinate submittal of related items.
- E. After Architect/Engineer review of submittal, revise and resubmit as required. Identifying changes made since previous submittal. For any submittal reviewed more than twice the architect will submit a fee for additional services to the owner with the fees being deducted from the general contractor's contract for construction.
- F. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit horizontal bar chart with separate bar for each major trade or operation identifying first work of each week.
- B. Show complete sequence of construction by activity. Identifying work of separate stages and other logically grouped activities. Show projected percentage of completion for each item of work as of time of each progress application for payment.
- C. Show submittal dates required for shop drawings, product data, and samples and product delivery dates, including those furnished by Owner and those under allowances.

1.05 SCHEDULE OF VALUES

- A. Submit typed schedule on AIA form G703: Contractor's standard form or media-driven print out will be considered on request.
- B. Format: Table of contents of this project manual. Identify each line item with number and title of the major specification sections.

- C. Include in each line item amount of allowances specified. For unit cost allowances, give quantities measured from contract documents multiplied by the unit cost equal to the total for the item.
- D. Include in each line item a directly proportional amount of contractor's overhead and profit.
- E. Revise schedule to list change orders, for each application for payment.

1.06 SHOP DRAWINGS

- A. Submit the number of opaque reproductions which contractor requires, plus two copies, which will be retained by Architect/Engineer.
- B. Timeline: Normal review time for each consultant is as follows; Architect – one week, Structural Engineer – two weeks, Civil Engineer – two weeks, MEP Engineer – four weeks (if submitted all at once); two weeks (each) if submitted in sections.

1.07 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to work. Include manufacturer's installation instructions when required by the specification section.
- B. Submit the number of copies which contractor requires, plus two copies, which will be retained by Architect/Engineer.

1.08 SAMPLES

- A. Submit full range of manufacturer's standard colors, textures, and patterns for Architect/Engineer's selection. Submit samples of selection of finishes within 30 days after date of contract. Architect will not allow time extensions or substitutions for materials not ordered within first thirty days of construction and later found not available for the project.
- B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification on each sample, giving full information.
- D. Submit the number specified in respective specification section; one will be retained by Architect/Engineer. Reviewed samples, which may be used in the work, are indicated in the specification section.

1.09 MANUFACTURER'S CERTIFICATE

- A. Submit certificates, in duplicate, in accordance with requirements of each specification section.

END OF SECTION

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART I GENERAL

1.01 SUMMARY

- A. Submit to Architect/Engineer, Shop Drawings, Product Data and Samples required by Specification Sections.
- B. Related Requirements Specified Elsewhere:
 - 1. Construction Schedule: Section 01310
 - 2. Testing Laboratory Services: Section 01400
 - 3. Project Record Documents: Section 01720
- C. Prepare and submit, with Construction Schedule, a separate schedule listing dates for submission and review of Shop Drawings. Product Data and Samples will be needed for each product.

1.02 SHOP

- A. Original drawings prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate some portion of the work; showing fabrication, layout, setting or erection details. No portion of the Contract Documents shall be reproduce for use as a part of the Shop Drawings.
- B. Prepared by a qualified detailed.
- C. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
- D. Reproductions for submittals: Reproducible Transparency with one Opaque Diazo Print.

1.03 PRODUCT DATA

- A. Manufacturer's Standard Schematic Drawings:
 - 1. Modify drawings to delete information not applicable to project.
- B. Manufacturer's Catalog Sheets, Brochures, Diagrams, Schedules, Performance Charts, Illustrations and other descriptive data.
 - 1. Clearly mark each copy to identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring diagrams and controls.

1.04 SAMPLES

- A. Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
- B. Office Samples of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of product or material.
 - 2. Full range of color samples.
- C. Field Samples and Moch-Ups:
 - 1. Erect at Project Site at location acceptable to Architect.
 - 2. Construct each complete including work of all trades required in finished work.

1.05 CONTRACTOR'S RESPONSIBILITIES

- A. Review and Approve Shop Drawings, Product Data and samples prior to submission and so indicate over his signature.
- B. Verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.

- C. Coordinate submittals with requirements of work and Contract Documents.
- D. Contractor's responsibility for deviations in submittals is not relieved by Architect/Engineer's review of submittal.
- E. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Architect/Engineer's review of submittals, unless Architect/Engineer gives written acceptance of specific deviations.
- F. Notify Architect/Engineers, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.
- G. Begin no work which required submittals until return of submittals with Architect/Engineer's stamp and initials or signature indicating review.
- H. After Architect/Engineer's review, distribute copies.

1.06 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least ten days before dates reviewed submittals will be needed.
- B. Shop Drawings: Submit one (1) Reproducible Transparency and one (1) Opaque Print.
- C. Product Data: Submit number of copies of Product Data which Contractor requires for distribution plus two (2) copies which will be retained by Architect/Engineer.
- D. Samples: Submit number of Samples specified in each Specification Section.
- E. Accompany submittals with transmittal letter in duplicate, containing:
 - 1. Date
 - 2. Project Title and Number
 - 3. Contractor's name and address
 - 4. The number of each Shop Drawing, Product Data and Sample Submitted
 - 5. Notification of Deviations from Contract Documents
 - 6. Other pertinent data
- F. For Work designed by consultants, make submission directly to consultant, and simultaneously submit duplicate of transmittal letter to Architect/Engineer.
- G. Submittals shall include:
 - 1. Date and Revision Dates
 - 2. Project Title and Number
 - 3. The names of:
 - a. Architect/Engineer
 - b. Contractor
 - c. Subcontractor
 - d. Supplier
 - e. Manufacturer
 - f. Separate detailed when pertinent
 - 4. Identification of product or material
 - 5. Relocation to adjacent structure or materials
 - 6. Field dimensions, clearly identified as such
 - 7. Specification Section number
 - 8. Applicable Standards, such as ASTM or Federal Specification
 - 9. A blank space 3" x 3" for the Architect/Engineer's stamp
 - 10. Identification of deviations from Contract Documents.
 - 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.
- H. If Shop Drawings which have been previously submitted for review are resubmitted, they shall clearly note any changes or additions that have been made to the previous submittal. After two reviews, General Contractor will be charged for review by the office of the Architect; fees to be deducted by Owner directly from the Contract for Construction.

1.07 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute copies of Shop Drawings and Product Data which carry Architect/Engineer's/Consultant's stamp to:
 - 1. Contractor's File

2. Job-Site File
3. Record Documents File
4. Other Prime Contractors
5. Subcontractors
6. Supplier
7. Fabricator
8. Architect (if shop drawings are submitted directly to Consultant)

1.08 ARCHITECT/ENGINEER'S DUTIES

- A. Review Submittals with reasonable promptness. Architect – one week; Structural Engineer – two weeks, Civil Engineer – two weeks, MEP Engineer – four weeks; two weeks (each) if submitted in sections.
- B. Review for:
 1. Design concept
 2. Information given in Contract Documents
- C. Review of Separate item does not constitute review of an assembly in which item functions.
- D. Affix stamp and initials or signature certifying review of submittal.
- E. Return submittals to contractor for distribution.

END OF SECTION

SECTION 01400

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. 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.
 - 2. 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.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Owner.
- C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- D. 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 industry standards.

QUALITY REQUIREMENTS

- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. 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. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. General: 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 uncertainties and requirements that are different, but apparently equal, to Owner 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 Owner for a decision before proceeding.

1.5 SUBMITTALS

- A. Qualification Data: 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. Reports: Prepare and submit certified written reports that include the following:
 - 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-inspecting.
- C. 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.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. 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.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. 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 548; 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.
- F. Factory-Authorized Technical Representative Qualifications: An authorized, full-time technical specialist employee representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of roofing systems that are similar in material, design, and extent to those indicated for this Project.

1.7 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. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 5. 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 manufacturer-authorized technical representative to inspect field-assembled components. Report results in writing as specified in Division 1 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Owner and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Owner and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.

- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections, including minor cutting and patching.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage of test samples.
 - 5. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Owner.
 - 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 Owner's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- 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 01400

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: During progress of work, the Owner may require testing to be performed to determine that materials provided meet specified requirements; such testing includes, but is not necessarily limited to:
 - 1. Soil Compaction
 - 2. Normal Weight Concrete
- B. Related Work Described Elsewhere: Requirements for testing may be described in various specification sections; where no testing requirements are described but Owner decides it is required, testing shall be performed under current pertinent testing standards.
- C. Testing Laboratory: The Testing Laboratory will be selected by the Owner.

1.2 QUALITY ASSURANCE

- A. Qualifications of testing laboratory: The laboratory will be qualified in accordance with ASTM E-329-70 "Recommended Practice for inspection and Testing Agencies for Concrete and Steel used in Construction."
- B. Codes and standards: Testing: In accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

1.3 PRODUCT HANDLING

- A. Promptly process and distribute test reports and related instructions to assure necessary retesting and/or replacement of materials with least possible delay in work.

PART 2 PRODUCTS

2.1 PAYMENT FOR TESTING SERVICES

- A. Initial Services: To be paid for by the Owner.
- B. Retesting: When initial tests indicate non-compliance with Contract Documents, subsequent retesting shall be performed by the same laboratory and costs thereof deducted by the Owner for the Contract Sum.

2.2 CODE COMPLIANCE TESTING

- A. Inspections and tests required by codes or ordinances, or by plan approval authority, and made by a legally constituted authority, shall be the responsibility of, and shall be paid for, by the Contractor and not borne by the Owner

2.3 CONTRACTOR'S CONVENIENCE TESTING

- A. Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

PART 3 EXECUTION

3.1 COOPERATION WITH TESTING LABORATORY

- A. Representatives of testing laboratory shall have access to work at all times; provide facilities for such access in order that laboratory may properly perform its function.

3.2 SCHEDULES FOR TESTING

- A. Establishing Schedule:

1. Determine with laboratory, time required to perform tests and issue findings.
 2. Provide required time in construction schedule.
- B. Revising Schedule: Coordinate changes of schedule with laboratory as required. Testing Laboratory shall provide a 24-hour phone number to enable the Contractor to revise the schedule at times other than regular business hours.
- C. Adherence to Schedule: When laboratory is prevented from testing or taking specimens according to the determined schedule due to incompleteness of work, extra costs attributable to delay may be back-charged to Contractor and not be borne by Owner.

3.3 TAKING SPECIMENS

- A. Testing Laboratory shall perform the following services:
1. Take samples and specimens as directed.
 2. Furnish sampling equipment and personnel.
 3. Deliver specimens and samples to laboratory.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Electricity, Lighting.
- B. Heat, Ventilation.
- C. Telephone services.
- D. Water
- E. Sanitary Facilities.
- F. Barriers.
- G. Cleaning during Construction.
- H. Project Identification.
- I. Field offices and sheds.
- J. Removal

1.02 RELATED REQUIREMENTS

- A. Section 01005 Administrative Provisions.

1.03 ELECTRICITY, LIGHTING

- A. Provide service required for construction operations, with branch wiring and distributions boxes located to allow services and lighting by means of construction operations.
- B. Provide lighting for construction operations.

1.04 HEAT, VENTILATION

- A. Provide as required to maintain specified conditions for construction operations, to protect materials and finishes from damages due to temperature or humidity.
- B. Prior to operation of permanent facilities for temporary purposes. Verify that installation is approved for operation, and that filters are in place.
- C. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.05 TELEPHONE SERVICES

- A. Provide telephone, fax and internet service to field office.

1.06 WATER

- A. Provide water services required for construction operations. Extended branch piping with outlets located so that water is available by use of hoses.

1.07 SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures.

1.08 BARRIERS

- A. Provide as required to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

1.09 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.
- B. Clean interior areas prior to start of finish work; maintain areas free of dust and other contaminants during finishing operations.

1.10 PROJECT IDENTIFICATION

- A. Provide 8' x 4' project identification sign of wood frame and exterior grade plywood construction, painted, with exhibit lettering by professional sign painter, to Architect, professional consultants, and contractor.
- B. Erect on site at location established by Architect and owner.
- C. Allow no other sign to be displayed.
- D. Information to be supplied by Architect.

1.11 FIELD OFFICES AND SHEDS

- A. Office: Weather-tight, with lighting, electrical outlets, heating, and ventilation equipment.
- B. Storage sheds for tools, materials, and equipment: Weather tight with adequate space for organized storage and access, and lighting for inspection off stored materials.

1.12 REMOVAL

- A. Remove temporary materials, equipment, services and construction prior substantial completion inspection.
- B. Clean and repair damages caused by installations to a depth of 2 feet; grade site as indicated. Restore existing facilities used during construction to specified, or to original, condition.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART I GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Products.
- B. Workmanship.
- C. Manufacturers' Instruction.
- D. Transportation and handling.
- E. Storage and protection.
- F. Substitutions and product options.

1.02 RELATED REQUIREMENTS

- A. Section 01005-Administrative Provisions.
- B. Section 01090-Reference Standards.
- C. Section 01300-Submittals: Submittal of Manufacturers Certificates.

1.03 PRODUCTS

- A. Products include material, equipment, and systems.
- B. Comply with specifications and referenced standards as minimum requirements.
- C. Components required to be supplied in quantity within a specification section shall be the same, and shall be interchangeable.

1.04 WORKMANSHIP

- A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies as specified in Section 01300, distribute copies to persons involved, and maintain one set in field office.
- B. Perform work in accordance with details of instructions and specified requirements. Should a conflict exist between specifications and instructions, consult with Architect/Engineer.

1.06 TRANSPORTATION AND HANDLING

- A. Transport products by methods to avoid product damage; deliver in an undamaged condition in manufacturer unopened containers or packing, dry.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.07 STORAGE AND PROTECTION

- A. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures: maintain within temperature and humidity ranges required by manufacturer's instructions.

- B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to avoid condensation.
- C. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
- D. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.
- E. After installation, provide coverings to protect products from damage from traffic and construction operations, remove when no longer needed.

1.08 PRODUCTS OPTIONS

- A. Within 30 days after date of contract, submit complete list of major products proposed, with name of manufacturer, trade name.
- B. Products specified by naming only on manufacturer: no option.

1.09 SUBSTITUTIONS

- A. During bidding, Architect/Engineer will consider requests from Prime bidders for substitutions received at least (7) days prior to bid date: requests received after that time will not be considered. No substitutions will be granted after the award of contract.
- B. Document each request with complete data substantiating compliance of proposed substitution with contract documents.
- C. Request constitutes a representation that contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
 - 2. Will provide the same warranty for substitution as for specified product.
 - 3. Will coordinate installation and make other changes which may be required for work to be complete in all respects.
 - 4. Waives claims for additional cost, which may subsequently become apparent.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of contract documents.
- E. Architect/Engineer will determine acceptability of proposed substitution, and will notify contractor of acceptance or rejection in writing within a reasonable time.

END OF SECTION

SECTION 01640

SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 GENERAL

1.01 PRODUCT LIST

- A. Within 30 days after date of Contract submit to Architect/Engineer five copies of complete list of all products which are proposed for installation. Request for substitutions shall be made in accordance with Paragraph 1.03.
- B. Tabulate list by each specification section.
- C. For products specified under Reference Standards, include with listing of each product:
 - 1. Name and Address of Manufacturer
 - 2. Trade Name
 - 3. Manufacturer's Data
 - 4. Model or Catalog Designation

1.02 CONTRACTOR'S OPTIONS

- A. For products specified only by Reference Standards, select any product meeting standards, by any manufacturer.
- B. For products specified by naming several products or manufacturers, select any product and manufacturer named.
- C. For products specified by naming one or more products, but indicating the option of selecting equivalent products e.g., by stating "or approved equal" after specified product, Contractor must submit request as required for substitution, for any product not specifically named.
- D. For products specified by naming only one product and manufacturer, there is no option, and substitution will be allowed by approval prior to bidding only.

1.03 SUBSTITUTIONS

- A. During bidding, Architect/Engineer will consider written requests from prime bidders for substitutions, received at least **Ten (10) Days Prior To Bid Date**; requests received after that time will not be considered. No substitutions will be granted after the award of contract.
- B. Submit five copies of request for substitution, include in request:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Documents.
 - 2. For products:
 - a. Product identification, including manufacturer's name and address.
 - b. Manufacturer's literature:
 - 1.) Product Description
 - 2.) Performance and Test Data
 - 3.) Reference Standards
 - c. Samples
 - d. Name and addresses of similar projects on which products were used, and date of installation.
 - 3. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
 - 4. *Itemized comparison of proposed substitution with product or method specified.*
 - 5. Data relating to changes in construction schedule.
 - 6. Relation to separate contracts.
 - 7. Accurate cost data on proposed substitution in comparison with product or method specified, including presenting credits to the Owner, where applicable.

- C. In making request for substitution, Bidder/Contractor represents:
1. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. He will provide the same guarantee for substitution as for product or method specified.
 3. He will coordinate installation of accepted substitution in work, making such changes as may be required for work to be complete in all respects.
 4. He waives all claims for additional costs related to substitution, which consequently becomes apparent.
 5. Cost data is complete and included all related costs under his contract or other contracts, which maybe affected by the substitution.
 6. He will reimburse the Owner for any redesign cost by the Architect/Engineer for accommodation of the substitution.
- D. Substitutions **Will Not** be considered if:
1. They are indicated or implied on Shop Drawings or Project Data Submittals without formal request submitted in accordance with Paragraph 1.03.
 2. Acceptance will require substantial revision of Contract Documents.

END OF SECTION

SECTION 01700

CONTRACT CLOSE-OUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Close-out Procedures.
- B. Final cleaning.
- C. Project record documents.
- D. Operation and Maintenance data.
- E. Systems Demonstration.
- F. Warranties and Bonds.

1.02 RELATED REQUIREMENTS

- A. Conditions of the contract: Fiscal provisions, legal submittals, and other administrative requirements.
- B. Section 01005-Administrative Provisions.
- C. Section 01500-Construction Facilities and Temporary Controls.

1.03 CLOSE-OUT PROCEDURES

- A. Comply with the procedures stated in the General Conditions of the Contract for issuance of Certificate for Substantial Completion.
- B. When Contractor considers work has reached final completion, submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect/Engineer's inspection.
- C. In addition to submittals required by the Conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted contract sum, previous payments, and remaining sum due.
- D. Architect/Engineer will issue a final change order reflecting approved adjustments to contract not previously made by Change Order.

1.04 FINAL CLEANING

- A. Execute prior to final cleaning.
- B. Clean interior and exterior surfaces to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition, clean roofs, gutters, down spouts, and drainage systems.
- C. Clean site; sweep paved areas, rake clean other areas.
- D. Remove waste and surplus materials, rubbish, and construction facilities from the project and from the site.

1.05 PROJECT RECORD DOCUMENTS(Final payment dependent upon submission)

- A. Maintain a Job Site, one copy of:
 - 1. Contract Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Reviewed Shop drawings
 - 5. Change Orders
 - 6. Other Modifications to Contract
 - 7. Field Test Records
- B. Store Documents in temporary Field Office, apart from Documents used for construction.
- C. Provide files and racks for storage of Documents.

- D. Maintain Documents in clean, dry, legible condition.
- E. Do not use Record Documents for construction purposes.
- F. Make Documents available at all times for inspection by Architect/Engineer and Owner.
- G. Maintain record even though no changes are made from original documents.
- H. Provide colored pencil for marking, conforming to follow color code:
 - 1. Red for Architectural Work
 - 2. Blue for Structural Work
 - 3. Green for Plumbing Work
 - 4. Orange for HVAC Work
 - 5. Brown for Electrical Work
 - 6. Black for other written notations
- I. Use colored pencils compatible with mylar sepia.
- J. Label each document "Project Record" in 2 high printed letters.
- K. Keep Record Documents current.
- L. Do not permanently conceal any work until required information has been recorded.
- M. Contract Drawings: legibly mark to record actual construction:
 - 1. Depth of various elements of foundation in relation to First Floor level.
 - 2. Horizontal and Vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
 - 3. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - 4. Field change of dimension and detail.
 - 5. Changes made by change order or written directive.
 - 6. Details not on original Contract Drawings.
- N. Specification and Addenda: legible mark up each Section to record:
 - 1. Manufacturer, Trade Name, Catalog Number, and Supplier of each product and item of equipment actually installed.
 - 2. Changes made by change order or written directive.
 - 3. Other matters not originally specified.
- O. Shop Drawings: Maintain as Record Documents: legibly annotate following drawings to record changes made after review:
 - 1. Structural Steel
 - 2. Reinforcing Steel
 - 3. Mill Work
- P. At completion of project, transfer all Project Record Data to one complete set of mylar sepia and deliver one complete set of mylar sepia of all drawings and one set of specifications containing all changes and modifications that occurred during construction to the Architect. The cost of printing the mylar sepia shall be paid by the Contractor.
- Q. Accompany submittal with transmitted letter, in duplicate, containing:
 - 1. Date
 - 2. Project Title and Number
 - 3. Contractor's Name and Address
 - 4. Title and Number of Each Record Document
 - 5. Certification that each Document as submitted is complete and accurate.
 - 6. Signature of Contractor, or his Authorized Representative.

1.06 OPERATION AND MAINTENANCE DATA(Final payment upon submission)

- A. Provide data for:
 - 1. Mechanical equipment and controls-Division 15.
 - 2. Electrical equipment and controls-Division 16.
- B. Submit three sets prior to final inspection, bound in 8 ½" x 11" three ring side binders with durable plastic covers.
- C. Part 1: Directory, listing names, addresses and telephone numbers of Architect/Engineer, General Contractor and sub-contractors.

- D. Part 2: Operation and maintenance instructions arranged by specification division. For each list:
 - 1. Appropriate design criteria.
 - 2. List of equipment.
 - 3. Parts list.
 - 4. Operating instructions.
 - 5. Maintenance instructions, equipment.
 - 6. Maintenance instructions, finishes.
 - 7. Shop drawings and product data.
 - 8. Warranties.

1.07 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, demonstrate operation of each system to Architect/Engineer and Owner.
- B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

1.08 WARRANTIES AND BONDS

- A. Provide duplicate, notarized copies. Execute contractor's submittals and assemble documents executed by subcontractors, suppliers, and manufacturers. Provide table of contents and assemble in binder with durable plastic cover.
- B. Submit material prior to final Application for Payment. For equipment put into use with Owner's permission during construction, submit within 10 days after first operation. For items of work delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

END OF SECTION

SECTION 01710

CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Related Requirements Specified Elsewhere:
 - 1. Cutting and Patching: Section 01070
 - 2. Cleaning for Specific Products or Work: Specification Section for that Work.
- B. Maintain premises and public properties free from accumulation of waste, debris, and rubbish, caused by operations.
- C. At completion of work, remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight exposed surfaces: leave project clean and ready for occupancy.

1.02 SAFETY REQUIREMENTS

- A. Standards: Maintain project in accord with applicable safety and insurance standards.
- B. Hazard Controls:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes, which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute cleaning to ensure buildings, grounds and public properties are maintained free from accumulations of waste materials and rubbish
- B. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- C. At reasonable intervals (maximum each week) during progress of work, clean site and public properties, and dispose of waste materials, debris and rubbish.
- D. Provide on-site containers for collection of waste materials, debris and rubbish.
- E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- F. Broom clean interior building areas and continue cleaning on an as-needed basis until building is ready for occupancy.
- G. Handle materials in a controlled manner with as few handling as possible: do not drop or throw materials from heights.
- H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING

- A. Employ experienced workmen, or professional cleaners, for final cleaning.
- B. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed interior and exterior finished surfaces; polish surfaces so designated for shine finish.
- D. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent surfaces.
- E. Broom clean paved surfaces; rake clean other surfaces of grounds.
- F. Replace air conditioning filters if units were operated during construction.
- G. Clean duct, blowers and coils, if air conditioning units were operated without filters during construction.
- H. Owner will assume responsibility for cleaning as of time designated on Certificate of Substantial Completion for Owner's acceptance of project or portion thereof.

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SUMMARY

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
- B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.
- C. Related requirements specified in other Sections:
 - 1. Shop Drawings, Product Data and Samples: Section 01340.
 - 2. Contract Closeout: Section 01720.
 - 3. Project Record Documents: Section 01720.
 - 4. Warranties and Bonds: Section 01740.

1.02 FORM OF SUBMITTALS

- A. Prepare data in the form of an instructional manual for use by Owner's personnel.
- B. Format:
 - 1. Size: 8½" x 11"
 - 2. Paper: 20 pound, minimum, white, for typed pages.
 - 3. Text: manufacturer's printed data, or neatly typewritten.
 - 4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to the size of text pages.
 - 5. Provide flyleaf for each separate product, and major component parts of equipment.
 - 6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE DATA". List:
 - a. Title of Project
 - b. Name of Contractor
- C. Binders:
 - 1. Commercial quality three-ring binders with durable and cleanable plastic covers.
 - 2. Maximum ring size: 3 inches.
 - 3. When multiple binders are used, correlate the data into related consistent groupings. Mark binders in sequence.

1.03 CONTENT OF MANUAL

- A. Table of Contents:
 - 1. Neatly typewritten table of contents for each volume. Base table of contents of Operating and Maintenance Data on table of contents of these specifications.
- B. Product Data:
 - 1. Include only those sheets, which are pertinent to the specific product.
 - 2. Annotate each sheet to:
 - a. Clearly identify the specific product or part installed.
 - b. Clearly identify the data applicable to the installation.
 - c. Delete references to inapplicable information.

3. List with each product, the name, address and telephone number of:
 - a. Subcontractors, including name of responsible principal, address and telephone number.
 - b. Maintenance contractor, as appropriate.
 - c. Identify the area of responsibility of each.
 - d. Local source of supply for parts and replacement.
- C. Drawings:
 1. Supplement product data with drawings as necessary to clearly illustrate:
 - a. Relations of component parts of equipment and systems.
 - b. Control and flow diagrams.
 2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
 3. Do not use Project Record Documents as maintenance drawings.
- D. Written text, as required to supplement product data for the particular installation.
 1. Organize in a consistent format under separate headings for different procedures.
 2. Provide a logical sequence of instructions for each procedure.
- E. Mechanical and Electrical Systems:
 1. The booklet shall contain a complete description of each system in the building as hereinafter outlined.
 - a. Description of Electrical System:
 - b. Manufacturer's catalog data and parts list on each piece of service entrance equipment and each electrical subpanel in the building.
 - c. Manufacturer's catalog data; cuts and parts list of all lighting fixtures and show in which rooms they were installed.
 - d. Manufacturer's catalog data, cuts, parts list and wiring diagrams on each piece of fire alarm system, sound system, program system, clock and bell system and all other systems. Data shall include 2 sets of drawings of circuitry by installer.
 - e. Provide four sets of drawings to include riser diagrams, panel schedules with directory of circuits and any revisions from Contract Drawings.
- F. Description of Plumbing System:
 1. Manufacturer's catalog data and parts list on each piece of plumbing equipment furnished.
 2. Maintenance and lubrication instructions must be on letterhead of the manufacturer of the equipment.
- G. Description of Heating and Air Conditioning System:
 1. Complete manufacturer's catalog data, cuts, parts list and wiring diagrams on each piece of heating and air conditioning equipment furnished.
 2. Manufacturer's catalog data, cuts, parts list and diagrams on each type of temperature control. Data shall include 2 sets of temperature control diagrams.
 3. Maintenance and lubrication instructions on each piece of equipment furnished: instructions must be on the letterhead of the manufacturer of the equipment.
- H. Finish Schedule:
 1. Provide a copy of the room finish schedule. Schedule shall identify each room by name and number, identify each type finish and color of floors, base, wainscot, walls, ceiling, and all other finishes. Where applicable, pattern or design identification numbers shall be included.

1.04 SUBMITTAL SCHEDULES

- A. General
 1. Prepare 2 copies of the Operating and Maintenance Data Booklet and deliver 2 copies of the booklet to the Architect.

END OF SECTION
Section 01730-2

SECTION 01740

WARRANTIES AND BONDS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Compile specified warranties and bonds and submit to Architect. Warranties to commence no earlier than the date of Substantial Completion.
- B. Related Requirements Described Elsewhere:
 - 1. Bid Security Section 00400
 - 2. Performed Bond and Labor and Material Payment Bond Section 00600
 - 3. Contract Close-out Section 01700
 - 4. Operating and Maintenance Data Section 01730
 - 5. General Warranty of Construction General Conditions

1.02 SUBMITTALS

- A. Assemble warranties, bonds and services and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Provide two original signed copies of each submittal.
- C. Make submittals within ten days after date of Substantial Completion, prior to final request for payment.

1.03 FORMAT

- A. Size: 8½" x 11", punch sheets for 3 ring binder. Fold larger sheets to fit into binder. Paper to be 20 pound, minimum, white, for typed pages.
- B. Cover: Identify each packet with typed title "Warranties and Bonds". List title of project and name of Contractor on cover.
- C. Binders: Commercial quality, 3 ring with durable and cleanable plastic covers.
- D. Table of Contents: Neatly typewritten table of contents for each volume. Base table of contents of Warranties and Bonds on table of contents of these specifications.
- E. Contents:
 - 1. Product of work item.
 - 2. Firm of origination of warranty, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for Owner's personnel.
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name or responsible principal, address and telephone number.

1.04 SUBMITTALS LIST

The following is an indication of guarantee required by various sections of these specifications, but is not limited to:

A.	Section 02281	Termite Control	-5 years bonded guarantee
B.	Section 07140	Below Grade Waterproofing	-2 years guarantee
C.	Section 07160	Dampproofing Above Grade	-5 years guarantee
D.	Section 07410	Standing Seam Metal Roofing	-20 years service guarantee
E.	Section 08120	Aluminum Doors and Frames	-5 years guarantee
F.	Section 08213	PlasClad Wood Doors	-Industry Standard Guarantee
G.	Section 09510	Acoustical Treatment	-1 year guarantee
		Suspension System	-15 years
H.	Section 10800	Toilet and Bath Accessories	-10 years for mirrors
			-10 years for hand dryers

END OF SECTION
Section 01740-1

SECTION 01780

PROJECT RECORD DOCUMENTS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record revisions to the Work:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Architects/Engineers written responses to Minor Change directives, Change Proposal Requests, and other supplemental instructions.
 - 5. Change Orders and other modifications to the Contract.
 - 6. Reviewed Shop Drawings, Product Data, and Samples.
 - 7. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner. Architect will review documents for general conformance but will not be responsible for completeness or accuracy of the recorded information.
- C. Do not use record documents for construction purposes. Store record documents separate from documents used for construction. Protect record documents from deterioration and loss in a secure, weather-tight location in accordance with Section 01501, Temporary Facilities.
- D. Record information concurrent with construction progress, not less than weekly. Provide access to record documents for Architect's reference during normal working hours.
- E. Give particular attention to information on concealed products and installations that would be difficult to identify or measure and record later.
- F. Mark record sets in red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
 - 1. Mark important additional information which was either shown schematically or omitted from original Documents.
 - 2. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.
 - 3. Where feasible, the individual or entity who obtained record data, whether the individuals or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record documents.
 - a. Accurately record information in an understandable drawing technique.
 - b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.
 - 4. Sign or initial and date each mark-up.
- G. Upon completion of the Work, submit Project Record Documents to Architect for the Owner's records in accordance with Section 01710, Closeout Procedures.

1.2 RECORD SPECIFICATIONS

A. Record Specifications: Maintain one complete copy of the Project Manual including addenda and modifications issued. Legibly mark and record at each product section a description of actual products installed and variations in actual Work performed in comparison with products specified. Include the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by addenda and modifications.
4. Related record drawing information and Product Data.
5. Other information necessary to provide a record of selections made and to document coordination with record Product Data submittals and maintenance manuals.

1.3 RECORD DRAWINGS

A. Record Drawings: Maintain one complete blackline copy of the Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown.

1. Legibly mark each item to record actual construction including, but not limited to the following:
 - a. Measured depths of foundations in relation to project finish floor datum.
 - b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - d. Field changes of dimension and detail.
 - e. Details not on original Contract drawings.
 - f. Revisions to details shown on the drawings.
 - g. Dimensional changes to the drawings.
 - h. Actual equipment locations.
 - i. Duct size and routing.
 - j. Changes made by Change Order; include change order number.

B. Mark completely and accurately record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked to reflect changes in the Work, record a cross-reference at the corresponding location on the Contract Drawings.

C. Preparation of Transparencies: Prepare a full set of corrected reproducible Contract Drawings and Shop Drawings.

1. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawings; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.
2. Remove Architects and Engineer's seal from drawings and specifications prior to issuance to Architect for approval.
3. Refer instances of uncertainty to the Architect for resolution.

1.4 RECORD PRODUCT DATA

A. Maintain one copy of each Product data submittal for record document purposes. Mark Product Data to indicate the actual product installation. Include significant changes in the product delivered to the site, and changes in manufacture's instructions and

recommendations for installation.

1.5 RECORD SAMPLE SUBMITTALS

A. Immediately prior to date of Substantial Completion, meet with the Architect, and Owner, at the Owner's discretion, at the site to determine which of the Samples maintained during the construction period shall be transmitted to Owner for record purposes. Comply with the Architect's instructions for packaging, identification marking, and delivery to Owner's Sample storage space. Dispose of other Samples in manner specified for disposal of surplus and waster materials.

1.6 MISCELLANEOUS RECORD DOCUMENTS

A. Refer to other Specification Sections for miscellaneous record- keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records, include, but are not limited to the following:

1. Ambient and substrate condition tests.
2. Changes requested by Owner's consultants.
3. Inspections and certifications by governing authorities.
4. Inspection and testing by Owner's inspection agency.
5. Fire resistance and flame spread test results.

1.7 CERTIFICATION

A. By submittal of Project Record Documents, Contractor certifies, that to the best of his knowledge, informational and belief the documents are a true and complete representation of the actual construction of the Work of this Project.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

**CIVIL SPECIFICATIONS - TABLE OF CONTENTS
FOR
LINN - SAN MANUEL EMERGENCY SERVICES FACILITY-PCT. NO.4**

DIVISION 2 – SITE WORK

02040	Seeding for Erosion Control	2
02083	Fiberglass Manholes	6
02084	Frames, Grates, Rings and Covers.....	2
02200	Earthwork & Site Grading.....	4
02233	Clearing and Grubbing	2
02270	Soil Erosion and Sediment Control	3
02316	Excavation and Backfill for Structures.....	7
02317	Excavation and Backfill for Utilities.....	11
02320	Utility Backfill Materials.....	8
02330	Embankment.....	3
02506	Polyvinyl Chloride Pipe.....	5
02512	Water Service Connections.....	2
02513	Wet Connections.....	1
02514	Disinfection of Water Lines	2
02515	Hydrostatic Testing of Pressure Pipelines.....	2
02516	Cast In Place Concrete Sitework.....	7
02521	Gate Valves.....	3
02528	Polyethylene Wrap	4
02531	Gravity Sanitary Sewers	5
02533	Testing for Sanitary Sewers	8
02535	Non-Metallic Utility Line Marking	2
02580	Pavement Marking	2
02611	Reinforced Concrete Pipe	3
02720	Storm Drainage System	4
02741	Asphaltic Concrete Pavement.....	6
02742	Prime Coat	4
02743	Tack Coat.....	3
02751	Concrete Pavement.....	10
02752	Concrete Pavement Joints	4
02753	Concrete Pavement Curing	2
02771	Curb, Curb and Gutter, and Headers	3
02775	Concrete Sidewalks.....	4
02920	Topsoiling and Finished Grading.....	2
02921	Hydro Mulch Seeding	3

DIVISION 3 – CONCRETE

03211	Reinforcing Steel.....	7

END OF DOCUMENT



SECTION 02230

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.
 - 2. Removing designated trees, shrubs, and other plant life.
 - 3. Removing abandoned utilities.
 - 4. Excavating topsoil.
- B. Related Sections:
 - 1. Section 02311 - Rough Grading.
 - 2. Section 02316 - Rock Removal.

PART 2 EXECUTION

2.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste area for placing removed materials.

2.2 PREPARATION

- A. Call Local Utility Line Information not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

2.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

2.4 CLEARING

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees and shrubs within marked areas. Remove stumps.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Apply herbicide to remaining stumps to inhibit growth.

2.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- C. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- D. Do not burn or bury materials on site. Leave site in clean condition.

2.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion.
- D. Remove excess topsoil not intended for reuse, from site.

END OF SECTION

SECTION 02315

EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil densification.
 - 2. Excavating for building foundations.
 - 3. Excavating for slabs-on-grade.
 - 4. Excavating for site structures.
- B. Related Sections:
 - 1. Section 02055 - Soils for Earthwork: Stockpiling excavated materials.
 - 2. Section 02060 - Aggregates for Earthwork: Stockpiling excavated materials.
 - 3. Section 02311 - Rough Grading: Topsoil and subsoil removal from site surface.
 - 4. Section 02316 - Rock Removal: Removal of rock during excavating.
 - 5. Section 02320 - Backfill.
 - 6. Section 02324 - Trenching: Excavating for utility trenches.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- B. Local utility standards when working within 24 inches of utility lines.

PART 2 EXECUTION

2.1 EXCAVATION

- A. Underpin adjacent structures which may be damaged by excavation work.
- B. Excavate subsoil to accommodate building foundations, slabs-on-grade.
- C. Excavate to working elevation for piling work.

- D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 02320 and Section 02324.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Trim excavation. Remove loose matter.
- G. Notify Architect/Engineer of unexpected subsurface conditions.
- H. Correct areas over excavated with structural fill.
- I. Remove excess and unsuitable material from site.
- J. Repair or replace items indicated to remain damaged by excavation.

2.2 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION

Section 02040

SEEDING FOR EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. "Seeding for Erosion Control" shall consist of preparing ground, providing for sowing of seeds, mulching with straw, hay or cellulose fiber and other management practices along and across such areas as are designated on the plans and in accordance with these specifications.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. Payment for square yard of ground cover using manufacturer recommended application rates.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

PART 2 PRODUCTS

2.01 GENERAL

- A. All seed must meet the requirements of the Texas Seed Law including the labeling requirements for showing pure live seed, (PLS = Purity x Germination), name and type of seed.
- B. Additional materials required shall be provided as required.

2.02 SEED

- A. Seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within nine months of the time of use on the project.
- B. Each variety of seed shall be furnished and delivered in separate bags or containers.
- C. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Engineer.
- D. Buffalo grass shall be treated with a fungicide approved the Engineer.
- E. The amount of seed planted per acre shall be of the type listed in the Table below.

<u>Common Name</u>	<u>Scientific Name</u>
Green Spragletop	Leptochloa dubia
Sidoats Grama (El Reno or Premier)	Boutleoua gracilis
Blue Grama (Texas Grown)	Bouteloua gracilis
Buffalo grass (Treated)	Buchloe dactyloides
Western Wheat grass	Agropyron smithii

Blackwell Switchgrass	Panicum virgatum
Caucasian Bluestem	Andropogon caucasicus
K.R. Bluestem	Andropogon lehmanniana
Lehmann Love grass	Pennisetum ciliare
Rhodegrass	Chloris gayana
Bermuda and Giant	Cynodon dactylon
Bermuda Grass (Hulle)	
Sand Dropseed	Sporobolus cryptandrum
Bahiagrass (Pensacola)	Paspalum noatum
Weeping Lovegrass	Eragrotis curvula
Sand Bluestem	Andropogon hallii

PART 3 EXECUTION

3.01 PLANTING SEASON

- A. All Planting shall be done between the dates specified for each highway district except as specifically authorized in writing
- B. The pure live seed planted per acre shall be of the type specified with the mixture, rate and planting dates as follows except as specifically shown on plans.
 - a. September 15 to March 1: Seeding to be with combination of 2 pounds per 1,000 square feet of un-hulled Bermuda grass (Cynoden Dactolyn) and 2 pounds per 1,000 square feet of winter rye with a purity of 95% germination.
 - b. March 2 to September 14: Seeding to be with hulled Bermuda grass (Cynoden Dactolyn) at a rate of 2 pounds per 1,000 square feet with a purity of 95% with 85% germination.

END OF SECTION

SECTION 02055

SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.
- B. Related Sections:
 - 1. Section 02060 - Aggregates for Earthwork.
 - 2. Section 02061 - Aggregates for Exterior Improvements.
 - 3. Section 02311 - Rough Grading.
 - 4. Section 02320 - Backfill.
 - 5. Section 02324 - Trenching.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

PART 2 PRODUCTS

2.1 SOURCE QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.

- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.1 EXCAVATION

- A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. Remove excess excavated materials subsoil and topsoil not intended for reuse, from site.
- D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02083

FIBERGLASS MANHOLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass manholes placed within traffic areas.
- B. Fiberglass manholes placed within non traffic areas.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. Payment for fiberglass manholes is on unit price basis for each manhole installed.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ANSI B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- C. ASTM C 270 - Standard Specification for Mortar for Unit Masonry.
- D. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non shrink).
- E. ASTM D 698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lb/ft³ (600kN-m/m³).
- F. ASTM D 2665 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and Fittings.
- G. ASTM D 2996 - Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe.
- H. ASTM D 2997 - Standard Specification for Centrifugally Cast "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe.
- I. ASTM D 3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells.
- J. American Association of State Highway and Transportation Officials (AASHTO).

1.04 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.

- B. Submit manufacturer's data and details of following items for approval:
1. Design and fabrication details of fiberglass manhole components
 2. Installation instruction for fiberglass manholes
 3. Frames, grates, rings, and covers
 4. Materials to be used in fabricating drop connections
 5. Materials to be used for pipe connections at manhole walls
 6. Materials to be used for stubs and stub plugs, if required
 7. Plugs to be used for sanitary sewer hydrostatic testing
 8. Manufacturer's data for pre-mix (bag) concrete if used for channel inverts and benches
 9. Manufacturer's color chart for fiberglass vent pipe coatings.
- C. Submittals listed in Section 02082, paragraph 1.04.

PART 2 PRODUCTS

2.01 FIBERGLASS MANHOLES AND BASE SECTIONS

- A. Provide prefabricated fiberglass manholes which conform in shape, size, dimensions, and details shown on Drawings and of sufficient strength to safely support HS-20 loading in accordance with AASHTO. Unless modified by Drawings, use manhole sections conforming to ASTM D 3753.
- B. Mark date of manufacture and name or trademark of manufacturer in 1-inch high stenciled letters on inside of barrel.
- C. Unless larger size is required, provide 48-inch-diameter barrel or 1.5 times the nominal pipe diameter of the largest pipe, which ever is larger for fiberglass manholes. A concentric reducer over the barrel of the manhole shall have an inside diameter of 23 inches. Provide wall section thickness for depth of manhole according to ASTM D 3753, but not less than 0.48 inches in thickness.
- E. Provide fabricated reducer bonded at factory to form one continuous unit at top of manhole barrel to accept concrete grade rings and cast iron frame and cover. Reducer design shall be of sufficient strength to safely support HS-20 loading in accordance with AASHTO.
- F. Provide manhole base of pre-cast, unless cast-in-place base is indicated on Drawings. For pre-cast manhole bases, use an approved steel-reinforced design of sufficient strength to withstand imposed loads. Form base so that joint with fiberglass manhole barrel is sealed against leakage, as shown on Drawings.

2.02 CONCRETE

- A. Conform to requirements of Section 03315 - Concrete for Utility Construction.
- B. Channel Inverts: Use 5 sack premix (bag) concrete or Class A concrete for inverts not integrally formed with manhole base, with minimum compressive strength of 4000 psi.

C. Concrete Foundation: Use Class A concrete with minimum compressive strength of 4000 psi for cast-in-place base and for foundation slab under manhole base section where indicated on Drawings.

D. Gravel: Provide gravel under base section, as shown on manhole Drawings.

2.03 REINFORCING STEEL

A. Provide reinforcing steel conforming to requirements of Section 03315 - Concrete for Utility Construction.

2.04 MISCELLANEOUS METALS

A. Provide cast-iron frames, rings, and covers conforming to requirements of Section 02084 - Frames, Grates, Rings, and Covers.

2.05 DROP CONNECTIONS AND STUBS

A. Provide drop connections and stubs conforming to same pipe material requirements used in main pipe, unless otherwise indicated on Drawings.

2.06 PIPE CONNECTIONS FOR SANITARY SEWERS

A. Attach PVC bell-end stub out no longer than 18 inches in length to the manhole by means of "Insert-a-Tee" gasket watertight compression connection or by fiberglass lay up in accordance with the manufacture's recommendations. Cutting of the manhole wall shall be by means of a hole saw only.

B. For drop, provide manufactured connector, such as Insert-a-Tee or equal, which provides positive seal between pipe and wall.

2.07 SEALANT MATERIALS

A. Butyl Sealant: Provide Press-Seal EZ Stick, or equal, for HDPE rings.

2.08 BACKFILL MATERIALS

A. Backfill materials shall conform to requirements of Section 02317 - Excavation and Backfill for Utilities.

2.09 NON-SHRINK GROUT

A. Provide prepackaged, inorganic, flowable, non-gas-liberating, nonmetallic, cement-based grout requiring only addition of water.

B. Grout shall meet requirements of ASTM C 1107 and shall have minimum 28-day compressive strength of 7000 psi.

2.10 VENT PIPES

A. Provide external vent pipes for manholes, where indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that lines and grades are correct.
- B. Determine if subgrade, when scarified and recompact, can be compacted to 95 percent of maximum Standard Proctor Density according to ASTM D 698 prior to placement of foundation material and base section. When it cannot be compacted to that density, moisture condition subgrade until that density can be reached or treat as an unstable subgrade.

3.02 PLACEMENT

- A. Install fiberglass manholes to conform to locations and dimensions shown on Drawings.
- B. Place sanitary sewer manholes at points of change of alignment, grade, size, pipe intersections, and end of sewer.

3.03 MANHOLE BASE SECTIONS AND FOUNDATIONS

- A. Place base section and foundation as shown on Drawings.

3.04 CAST-IN-PLACE FOUNDATION

- A. Where Drawings indicate cast-in-place manhole base, place concrete as shown on Drawings on 4-inch (minimum) layer of gravel. When unstable subgrade is identified, over-excavate subgrade to allow for placement of 12 inch thick layer of gravel wrapped in filter fabric.

3.05 MANHOLE BARREL

- A. Lower manhole barrel onto base section. Seal with manufacturer's gasket or approved sealant. Wrap joint with external sealing material, minimum 12-inch width.
- B. Where cast-in-place base is used, support manhole barrel in place and brace it from sides of excavation to prevent any movement of barrel during concrete placement and while concrete is setting. Provide minimum clearance between reinforcing steel and manhole barrel bottom as shown on Drawings. Do not support manhole barrel on reinforcing steel. Place bead of water swelling sealant around inside of barrel near bottom, as shown on Drawings, to form seal.

3.06 PIPE CONNECTIONS AT PRECAST MANHOLE BASE

- A. Install approved resilient connectors at each pipe entering and exiting sanitary sewer manholes in accordance with manufacturer's instructions.
- B. Ensure that no concrete, cement stabilized sand, fill, or other solid material is allowed to enter space between pipe and edge of wall opening at and around resilient connector on either interior or exterior of manhole. When necessary, fill space with compressible material to ensure full flexibility provided by resilient connector.
- C. Test connection for watertight seal before backfilling.

3.07 PIPE CONNECTIONS AT CAST-IN PLACE BASE

- A. Cut manhole barrel for pipe penetrations following curvature of pipe and with maximum of 1-inch clearance. Seal cut edges with resin. Hole shall be circular.
- B. Place continuous bead of water swelling sealant, as shown on Drawings, around pipe

penetrations on interior of manhole barrel. Roughen surface of fiberglass prior to placement to improve bond with sealant. Allow sealant to completely cure before placing concrete against it.

- C. Extend pipe entering manhole at least 8 inches into manhole. Fit pipes with an Insert-a-Tee" gasket watertight compression connection placed tightly around pipe using stainless steel clamp. Alternately, pipes may have continuous bead of water swelling sealant, as detailed on Drawings, placed around pipe circumference.
- D. When forming invert surface in bottom of manhole, mound concrete around pipe penetrations so that water swelling sealant beads and neoprene water-stop gasket have minimum 2 inches of concrete cover.
- E. Test connection for watertight seal before backfilling.

3.08 INVERTS FOR SANITARY SEWERS

- A. Construct invert channels as shown on Drawings.

3.09 DROP CONNECTIONS FOR SANITARY SEWERS

- A. Backfill drop assembly with gravel.
- B. Install drop connection when sewer line enters manhole higher than 30 inches above invert of manhole.
- C. At drop pipe connections through fiberglass barrel, cut circular hole sized to requirements of manufactured connector. Seal cut edge with resin. Install watertight connector according to manufacturer's recommendations.

3.10 STUBS FOR FUTURE CONNECTIONS

- A. Where future connections are indicated on Drawings, install resilient connectors and pipe stubs with approved watertight plugs in manholes.
- B. At cast-in-place base, where future connections are indicated on Drawings, install section of pipe extending no further than 12 inches from edge of foundation, ending in bell and provided with rubber-gasket watertight plug.

3.11 ADJUSTMENT RINGS AND FRAME

- A. Adjust HDPE rings so that elevation of installed casting cover matches pavement surface. Do not load manhole except on load bearing shoulder of manhole. Seal between adjustment ring and fiberglass manhole with approved sealant material. Set cast iron frame on adjustment ring in bed of approved sealant material. Install sealant bed consisting of two beads on sealant, each bead having minimum dimensions of 1/2-inch and 1/2-inch wide.
- B. Wrap manhole frame and adjustment rings with external sealing material, minimum 3 inches beyond joint between ring and frame and ring.
- C. Set cast iron frame on top of cone or adjustment rings using water swelling sealant materials and adjust elevation of casting cover to match pavement surface. For manholes in unpaved areas, set top frame minimum of 6 inches above existing ground line unless otherwise, indicated on Drawings.

3.12 BACKFILL

- A. After leakage testing, place and compact backfill material in area of excavation surrounding manholes in accordance with requirements of Section 02317- Excavation and Backfill for Utilities. Use embedment zone backfill material, as specified for adjacent utilities, from manhole foundation up to elevation 12-inches over each pipe connected to manhole. Provide trench zone backfill, as specified for adjacent utilities, above embedment zone backfill.
- B. In unpaved areas, provide positive drainage away from manhole frame to natural grade. Provide minimum of 4-inches of topsoil.

3.13 FIELD QUALITY CONTROL

- A. Conduct leakage testing of sanitary sewer manholes in accordance with requirements of Section 02533 - Testing for Sanitary Sewers.

3.14 PROTECTION

- A. Protect manholes from damage until work has been finally accepted. Repair damage to manholes at no additional cost to Owner.

END OF SECTION

SECTION 02084

FRAMES, GRATES, RINGS AND COVERS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Iron castings for manhole frames and covers, inlet frames and grates, catch basin frames and grates, meter vault frames and covers, adjustment rings, and extensions.
- B. Ring grates.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

- 1. No payment will be made for frames, grates, rings, covers, and seals under this Section. Include payment in price for related item.

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures~~

1.03 REFERENCES

- A. AASHTO - American Association of State Highway and Transportation Officials Standard Specification for Highway Bridges
- B. ASTM A 48 - Standard Specification for Gray Iron Castings
- C. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- D. AWS - D 12.1 Welding Reinforcing Steel.

1.04 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit copies of manufacturer's specifications, load tables, dimension diagrams, anchor details, and installation instructions.
- C. Submit shop drawings for fabrication and installation of casting assemblies that are not included in Drawings. Include plans, elevations, sections and connection details. Show anchorage and accessory items. Include setting drawings for location and installation of castings and anchorage devices.

PART 2 P R O D U C T S

2.01 CASTINGS

- A. Use castings for frames, grates, rings and covers conforming to ASTM A 48, Class 35B. Provide locking covers if indicated on Drawings.
- B. Use clean castings capable of withstanding application of AASHTO M306- 40,000 pound

proof loading without detrimental permanent deformation.

- C. Fabricate castings to conform to shapes, dimensions, and with wording or logos shown on Drawings. Standard dimensions for manhole covers are 33.58 inches in diameter.
- D. Use clean castings, free from blowholes and other surface imperfections. Use clean and symmetrical cast holes in covers, free of plugs.

2.02 BEARING SURFACES

- A. Machine bearing surfaces between covers or grates and their respective frames so that even bearing is provided for position in which casting may be seated in frame.

2.03 SPECIAL FRAMES AND COVERS

- A. Where indicated on Drawings, provide watertight manhole frames and covers with minimum of four bolts and gasket designed to seal cover to frame. Supply approved watertight manhole covers and frames.
- B. Where shown on Drawing, provide manhole frames and covers with 48 inch diameter clear opening, with inner cover for 22.5 inch diameter clear opening. Provide approved inner cover with pattern shown on Drawings.

2.04 FINISH

- A. Unless otherwise specified, uncoated coat iron.

2.05 FABRICATED RING GRATES

- A. Fabricate ring grates from reinforcing steel conforming to ASTM A 615.
- B. Conform to welds connecting bars to AWS D 12.1.

2.06 ADJUSTMENT RINGS FOR ASPHALT OVERLAYS

- A. Use castings conforming Section 2.01.
- B. One piece casting with dimensions to fit frame and cover.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install castings according to approved shop drawings, instructions in related specifications, and applicable directions from manufacturer's printed materials.
- B. Set castings accurately at required locations to proper alignment and elevation. Keep castings plumb, level, true, and free of rack. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in form work until permanently set.

END OF SECTION

SECTION 02200
EARTHWORK & SITE GRADING

PART 1 - GENERAL**1.1 SCOPE**

- A. Perform all work required to complete the project as indicated by the Contract Documents, and furnish all supplementary items necessary for the completion of all work specified in this Section.
- B. The work included in this Section shall include furnishing all labor, tools, materials and incidentals required to complete the work; excavate and fill to the lines, elevations and limits shown on the drawings for all pavements, buildings, landscaped areas, etc. as indicated below and cleaning up. The landscaped areas shall be graded to an elevation 6 inches below finished grade allowing for topsoil placement. The pavement areas shall be graded to an elevation below finished grade allowing for pavement placement. Building foundation areas shall be prepared in accordance with the geotechnical investigation and these specifications. The Contractor shall comply with all requirements of the city standards, the E.P.A. requirements and with the standards and specifications stated herein. All earthwork shall be done in accordance with the Geotechnical Investigation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02233 – Clearing & Grubbing
- B. Section 02270 - Soil Erosion and Sediment Control
- B. Section 02751 - Concrete Pavement

1.3 QUALITY ASSURANCE

- A. Codes and Standards
 - 1. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction. The contractor shall have a trench safety plan prepared by a registered professional engineer for all excavations in excess of 5 feet deep.
- B. Testing and Inspection Service
 - 1. The owner will engage a soil testing and inspection service for quality control testing during earthwork operations to inspect and test all soil materials proposed for use in all excavation and fill operations.

1.4 JOB CONDITIONS

- A. 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. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult owner immediately for directions as to how to proceed. Cooperate with owner, public and private utility companies in keeping services and

facilities in operation. Repair damaged utilities to satisfaction of utility owner.

3. Do not interrupt existing utilities serving facilities occupied and used by owner or adjacent properties, except when permitted in writing by property owner and then only after temporary utility services have been provided.
- B. Use of Explosives
 1. The use of explosives is not permitted.
- C. Protection of Persons and Property
 1. Barricade open excavations occurring as part of this work and post with warning lights. Provide traffic control as required by the city and as required to protect the public.
 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout and other hazards created by excavation operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Fill Material:
 1. Onsite excavated material free from trash, vegetation, rocks and lumps of earth larger than 4 inches in diameter or other objectionable material. Imported fill, if required, shall also be clean and have a liquid limit less than 50 percent.
- B. Select Material:
 1. Uniformly blended clayey sand to very sandy with a plasticity index between 6 and 15 and liquid limit of less than 35 percent.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which earthwork and site grading operations are to be performed. After excavation to subgrade, proofroll with a heavy pneumatic tired roller, loaded dump truck or similar equipment weighing approximately 25 tons or greater to help compact pockets of loose soil and expose additional areas of weak, soft or wet soils in the presence of the owner's representative. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 EXCAVATION

- A. The Contractor shall excavate to the lines and elevations shown on the drawings, as previously indicated herein, regardless of the type, condition, or moisture content of the material encountered. Conduct excavation operations to provide positive drainage, at contractor's expense, at all times during construction. If positive drainage cannot be maintained, contractor shall keep standing water out of all excavations with adequate

dewatering equipment.

- B. All areas shall be cut accurately to the indicated grades. Care shall be taken to prevent excavation below the grades indicated and any bottoms or slopes that have been undercut shall be backfilled with approved materials and compacted to the required fill density.
- C. Excavation required for rough grading shall be finished within a tolerance of 0.10 foot above or below the rough grade and in no case shall depressions be left that will not completely drain.

3.3 BUILDING SUBGRADE

- A. Follow recommendations in geotechnical report and on the structural drawings.

3.4 FILLING

- A. Remove all vegetation, organic materials and debris prior to placing fill.
- B. Fill used below the parking and landscape areas shall be onsite soils encountered in the excavation or imported fill except grass, weeds, roots, vegetation and similar materials. The largest rock, particle or clod shall be less than 4 inches in diameter prior to compaction.
- C. Care should be taken that utility cuts are not left open for extended periods and that cuts are properly backfilled. A positive cut-off of 1' thick compacted clay at the building line shall be used to help prevent water from migrating in the utility trench.
- D. Before fill is placed under pavement or if subgrade is in an excavation, subgrade soils shall be scarified to a depth of 8" and recompacted between 93 and 98 percent of maximum dry density per ASTM D698 at a moisture content from +2 to +5 percent above optimum moisture content.
- E. Fill below all pavement and landscaped areas shall be placed in 6 to 8 inch loose lifts and compacted to a minimum dry density of 95 percent of the standard proctor density (ASTM D698) under pavement and 90 percent elsewhere. The moisture content shall be between -1 and +3 percent above optimum.
- F. Compaction shall be obtained by use of sheeps foot rollers, rubber-tired rollers, or other approved equipment capable of obtaining the required density. In the event the embankment material is too wet or too dry for adequate compaction, the contractor shall add moisture or dry the material as required to the extent necessary to obtain the required density.

3.5 PAVEMENT SUBGRADE

- A. Construct subgrades for paved areas to conform to the grades, lines and cross sections shown on the drawings and per the recommendations in the geotechnical report.
- B. After the pavement subgrades have been shaped and compacted, bring the surface to a firm, unyielding surface by rolling the entire area with an approved vibratory roller. Compact all areas inaccessible to the roller with hand tampers weighing not less than 50 pounds, and with face area not more than 100-square-inches. Unless the material at the time of the rolling contains sufficient moisture to insure proper compaction, add water as directed before compacting. Allow the material containing excess moisture to dry to the proper consistency and moisture content before being compacted.

3.6 MOISTURE CONTROL

- A. Where soil material must be moisture conditioned before compaction, uniformly apply required amount of water to surface of soil material in such manner as to prevent free water appearing on surface during, or subsequent to, compaction operations.
- B. Remove and replace, or scarify and air dry soil material that is too wet to permit compaction to specified percentage of maximum density.
- C. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread on surface where directed by owner's representative and permitted to dry. Assist drying by discing, harrowing or pulverizing until moisture-density relation tests fall within the herein-specified range.

3.7 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction
 - 1. ~~Testing laboratory services shall be in accordance with section 01410.~~
 - 2. Allow owner's testing service to inspect and approve subgrades and fill layers before further construction work is performed. In the building areas, there will be at least 1 density test per 2500 square feet per lift with a minimum of 3. In the pavement areas there will be at least 1 density test per 5000 square feet per lift with a minimum of 3.
 - 3. If, in the opinion of the owner, based on testing service and inspection, the subgrade or fills which have been placed are below the specified density, the contractor shall provide additional compaction and testing at no additional expense to the owner.
 - 4. The results of density tests which may be selected will be considered satisfactory when they are in each instance equal to or greater than the specified density, and if not more than 1 density test out of 5 has a value greater than 2% below the required density.

3.8 MAINTENANCE

- A. Protection of Graded Areas
 - 1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 - 2. Repair and re-establish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Reconditioning Compacted Areas
 - 1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction. Use hand tamping for recompaction over underground utilities.

3.8 DISPOSAL OF EXCESS AND WASTE MATERIALS

Remove all excess excavation, trash, debris and waste materials, and legally dispose of off the owner's property, at no additional cost.

END OF SECTION

Section 02233

CLEARING AND GRUBBING

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Removing surface debris and rubbish.
- B. Clearing site of plant life and grass.
- C. Removing trees and shrubs.
- D. Removing root system of trees and shrubs.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. No Separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items for which this work is a component.
- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for disposal of debris.
- B. Coordinate clearing work with utility companies.

1.04 SUBMITTALS

- A. Conform to the requirements of Submittal Procedures Section of this Project Manual.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N

3.01 PREPARATION

- A. Verify that existing plant life and features designated to remain are identified and tagged. Submit preconstruction photographs in accordance with the applicable portions of the Construction Photographs Section.

3.02 PROTECTION

- A. Protect the following from damage or displacement:
 - 1. Living trees located 3 feet or more outside of the intersection of side slopes and original ground line.
 - 2. Plants other than trees and landscape features designated to remain.

3. Utilities designated to remain.
4. Bench marks, monuments, and existing structures designated to remain.

3.03 CLEARING

- A. Remove stumps, main root ball, and root system to:
 1. A depth of 24 inches below the finished subgrade elevation in the area bounded by lines two feet behind back of curbs.
 2. A depth of 24 inches below the finished surface of the required cross section for other areas.
- B. Clear undergrowth and deadwood without disturbing subsoil.
- C. Remove vegetation from top soil scheduled for reuse.

3.04 REMOVAL

- A. Remove debris, rubbish, and extracted plant material life from the site in accordance with requirements of Waste Material Disposal.

END OF SECTION

SECTION 02270
SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL**1.1 SECTION INCLUDES**

- A. Furnish all labor, materials, tools, equipment, and services for all soil erosion and sediment control, as indicated, in accord with provisions of Contract Documents.
- B. Completely coordinate with work of all other trades.
- C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation in order to meet the United States Environmental Protection Agency requirements.

1.2 QUALITY ASSURANCE

- A. Erosion Control Standards:
 - 1. United States Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES) - Storm Water Management for Construction Activities.
 - 2. North Central Texas Council of Governments (NCTCOG) - Storm Water Quality Best Management Practices for Construction Activities.

1.3 EROSION CONTROL PRINCIPLES:

- A. Perform demolition, construction and other soil disturbances in a manner which minimizes soil erosion.
- B. Retain and protect existing vegetation as much as is feasible.
- C. Keep area which is exposed and free of vegetative cover to a minimum, within practical limits.
- D. Protect exposed critical areas during prolonged construction or other land disturbance by temporary seeding, mulching or other suitable stabilization measures.

1.4 JOB CONDITIONS:

- A. Comply with all requirements of the EPA for implementation of the storm water pollution prevention plan, under the NPDES General Permits for Storm Water Discharges from Construction Sites.

1.5 SUBMITTALS

- A. Project Information:
 - 1. Submit copy of NPDES Storm Water Permit for Construction Activities to Owner prior to construction.

PART 2 - PRODUCTS**2.1 MATERIALS:**

- A. Filter Fabric: Sediment control silt fabrics, AMOCO Style #2125 or approved equal.
- B. Crushed stone.
- C. Metal clips or ties.
- D. Steel fence posts.
- E. Grass Seed: annual ryegrass or Bermuda depending on the season.
- F. Concrete block.
- G. Wire screen.

PART 3 - EXECUTION**3.1 BEGINNING CONSTRUCTION**

- A. Prior to general demolition, install temporary silt fences and stabilized construction entrance as indicated on the storm water pollution prevention plan or where directed by Owner.
- B. Construct erosion control devices in accordance with the storm water pollution prevention plan and as directed by the Owner during demolition and as demolition progresses.
- C. Seed disturbed areas where construction activities temporarily cease at rate necessary to achieve a full stand of grass. Reseed as required until good stand of grass is achieved.

3.2 DURING CONSTRUCTION

- A. Maintain temporary silt fences.
- B. Inspect regularly, especially after rainstorms.
- C. Repair or replace damaged or missing items.
- D. Sow temporary grass cover over disturbed areas where construction activities temporarily cease for more than 21 days and as required by NPDES permit.
- E. Install inlet protection as indicated by the storm water pollution prevention plan at each inlet.
- F. Provide swales and dikes as necessary to direct all water towards a protected device.
- G. Do not disturb existing vegetation (grass and trees) outside limits of demolition.
- H. Remove sediment from behind temporary silt fences when it reaches a depth of 6 in.

3.3 COMPLETION OF CONSTRUCTION AND STABILIZATION OF THE SITE

- A. Remove from site all temporary erosion control devices.

END OF SECTION

SECTION 02311

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating topsoil.
 - 2. Excavating subsoil.
 - 3. Cutting, grading, filling, compacting site for site structures, building pads.
- B. Related Sections:
 - 1. Section 02055 - Soils for Earthwork: Soils for fill.
 - 2. Section 02060 - Aggregates for Earthwork: Aggregates for fill.
 - 3. Section 02230 - Site Clearing: Excavating topsoil.
 - 4. Section 02315 - Excavation and Fill: Building excavation.
 - 5. Section 02316 - Rock Removal.
 - 6. Section 02320 - Backfill: General building area backfilling.
 - 7. Section 02324 - Trenching: Trenching and backfilling for utilities.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
 - 7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
 - 8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 EXECUTION

2.1 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.
- D. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

2.2 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact as required.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.

2.3 FIELD QUALITY CONTROL

- A. Perform in place compaction tests in accordance with the following:
 1. As required by geotechnical engineer.

END OF SECTION

SECTION 02316

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, backfilling, and compaction of backfill for structures.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.

1. No payment will be made for structural excavation and backfill under this Section. Include payment in unit price or lump sum for construction of structures.

- ~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 DEFINITIONS

- A. Unsuitable Material: Unsuitable soil materials are the following:

1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
2. Materials that cannot be compacted to required density due to gradation, plasticity, or moisture content.
3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
4. Materials that are contaminated with hydrocarbons or other chemical contaminants.

- B. Suitable Material: Suitable soil materials are those meeting specification requirements.

- C. Select Material: Material as defined in Section 02320 - Utility Backfill Materials.

- D. Backfill: Select material meeting specified quality requirements, placed and compacted under controlled conditions around structures.

- E. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for structure foundation base.

- F. Foundation Base: For foundation base material, use gravel aggregate with filter fabric as required. Foundation base provides smooth, level working surface for construction of concrete foundation.

- G. Foundation Subgrade: Foundation subgrade is surface of natural soil which has been excavated and prepared to support foundation base or foundation backfill, where needed.

- H. Ground Water Control Systems: Installations external to excavation such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of excavation, and depressurization to prevent failure or heaving of excavation bottom. Refer to Section 01578 - Control of Ground Water and Surface Water.
- I. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from excavation. Remove rain water and surface water which accidentally enters excavation as part of excavation drainage.
- J. Excavation Drainage: Removal of surface and seepage water in excavation by sump pumping and using French drains surrounding foundation to intercept water.
- K. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below foundation as shown on Drawings, and backfilled with foundation backfill material.
- L. Shoring System: Structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins.

1.04 REFERENCES

- A. ASTM D 698 - Standard Test Methods for Laboratory Compaction of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600kN-m/m³)).
- B. ASTM D 1556 - Standard Test Method for Density of Soil in Place by Sand-Cone Method.
- C. ASTM D 2922 - Standard Test Methods for Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- D. ASTM D 3017 - Standard Test Method for Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
- E. ASTM D 4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- F. TxDOT Tex-101-E - Preparing Soil and Flexible Base Materials for Testing.
- G. TxDOT Tex-110-E - Particle Size Analysis of Soils.
- H. Federal Regulations, 29 CFR, Part 1926, Standards - Excavation, Occupational Safety and Health Administration (OSHA).

1.05 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
 - B. Submit work plan for excavation and backfill for each structure with complete written description which identifies details of proposed method of construction and sequence of operations for construction relative to excavation and backfill activities. Use descriptions, with supporting illustrations, sufficiently detailed to demonstrate to Engineer that procedures meet requirements of Specifications and Drawings.
 - C. Submit excavation safety system plan.
1. Submit excavation safety system plan in accordance with applicable OSHA requirements for

excavations.

2. Submit excavation safety system plan in accordance with requirements of OSHA, for excavations that fall under State and Federal trench safety laws.
- D. Submit ground and surface water control plan if needed.
- E. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.
- F. Submit project record documents. Record location of utilities, as installed, referenced to survey benchmarks. Include location of utilities encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.06 TESTS

- A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory provided by Owner in accordance with requirements of Section 01454 - Testing Laboratory Services and as specified in this Section.
- B. Perform embedment and backfill material source qualification testing.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with equipment suitable for achieving requirements of this Specification.
- B. Use equipment which will produce degree of compaction specified. Compact backfill within 3 feet of walls with hand operated equipment. Do not use equipment weighing more than 10,000 pounds closer to walls than a horizontal distance equal to depth of fill at that time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

2.02 MATERIAL CLASSIFICATIONS

- A. Use backfill materials conforming to classifications and product descriptions of Section 02320 - Utility Backfill Materials. Use classification or product description for backfill applications as shown on Drawings and as specified.

PART 3 EXECUTION

3.01 PREPARATION

- A. Conduct an inspection to determine condition of existing structures and other permanent installations.
- B. Set up necessary street detours and barricades in preparation for excavation if construction will affect traffic. Maintain barricades and warning devices at all times for streets and intersections where work is in progress, or where affected by Work, and is considered hazardous to traffic movements.
- C. Perform work in accordance with OSHA standards. Employ an excavation safety system as specified by OSHA.

- D. Remove existing pavements and structures, including sidewalks and driveways.
- E. Install and operate necessary dewatering and surface water control measures if needed.

3.02 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within grading limits as designated on Drawings.
- B. Protect and support above-grade and below-grade utilities which are to remain.
- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities is indicated on Drawings.
- D. Prevent erosion of excavations and backfill. Do not allow water to pond in excavations.
- E. Maintain excavation and backfill areas until start of subsequent work. Repair and re-compact slides, washouts, settlements, or areas with loss of density at no additional cost to the Owner.

3.03 EXCAVATION

- A. Perform excavation work so that underground structure can be installed to depths and alignments shown on Drawings. Use caution during excavation work to avoid disturbing surrounding ground and existing facilities and improvements. Keep excavation to absolute minimum necessary. No additional payment will be made for excess excavation not authorized by Engineer.
- B. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify Engineer and obtain instructions before proceeding in such areas.
- C. Immediately notify agency or company owning any line which is damaged, broken or disturbed. Obtain approval from Engineer and agency for any repairs or relocations, either temporary or permanent.
- D. Avoid settlement of surrounding soil due to equipment operations, excavation procedures, vibration, dewatering, or other construction methods.
- E. Provide surface drainage during construction to protect work and to avoid nuisance to adjoining property. Where required, provide proper dewatering and piezometric pressure control during construction.
- F. Conduct hauling operations so that trucks and other vehicles do not create dirt nuisance in streets. Verify that truck beds are sufficiently tight and loaded in such a manner such that objectionable materials will not spill onto streets. Promptly clear away any dirt, mud, or other materials that spill onto streets or are deposited onto streets by vehicle tires.
- G. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed, replace those which are damaged or destroyed by Work.
- H. Provide sheeting, shoring, and bracing where required to safely complete Work, to prevent excavation from extending beyond limits indicated on Drawings, and to protect Work and adjacent structures or improvements. Use sheeting, shoring, and bracing to protect workmen and public conforming to requirements of OSHA.
- I. Prevent voids from forming outside of sheeting. Immediately fill voids with grout, cement stabilized sand, or other material approved by Engineer and compact to 95 percent standard

density.

- J. After completion of structure, remove sheeting, shoring, and bracing unless shown on Drawings to remain in place or directed by Engineer in writing that such temporary structures may remain. Remove sheeting, shoring and bracing in such a manner as to maintain safety during backfilling operations and to prevent damage to Work and adjacent structures or improvements.
- K. Immediately fill and compact voids left or caused by removal of sheeting with cement stabilized sand or other material approved by Engineer and compact to 95 percent standard density.

3.04 HANDLING EXCAVATED MATERIALS

- A. Classify excavated materials. Place material which is suitable for use as backfill in orderly piles at sufficient distance from excavation to prevent slides or cave-ins.
- B. Provide additional backfill material, if adequate quantities of suitable material are not available from excavation and trenching operations at site.

3.05 DEWATERING

- A. Provide ground water control if needed.
- B. Keep ground water surface elevation minimum of 2 feet below bottom of foundation base.
- C. Maintain ground water control and surface water until structure is sufficiently complete to provide required weight to resist hydrostatic uplift with minimum safety factor of 1.2.

3.06 FOUNDATION EXCAVATION

- A. Notify Engineer at least 48 hours prior to plan completion of foundation excavations. Do not place foundation base until excavation is accepted by Engineer.
- B. Excavate to elevations shown on Drawings, as needed to provide space for foundation base, forming level undisturbed surface, free of mud or soft material. Remove pockets of soft or otherwise unstable soils and replace with foundation backfill material or material as directed by Engineer. Prior to placing material over it, re-compact subgrade where indicated on Drawings, scarifying as needed, to 95 percent of maximum Standard Dry Density according to ASTM D 698. If specified level of compaction cannot be achieved, moisture condition subgrade and re-compact until 95 percent is achieved, over-excavate to provide minimum layer of 24 inches of foundation backfill material, or other means acceptable to Engineer.
- C. Fill unauthorized excessive excavation with foundation backfill material or other material as directed by Engineer.
- D. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition. Keep excavations free of standing water and completely free of water during concrete placement.
- E. Remove soils which become unsuitable due to inadequate dewatering or other causes, after initial excavation to required subgrade, and replace with foundation backfill material, as directed by Engineer, at no additional cost to Owner.
- F. Place foundation base, or foundation backfill material where needed, over subgrade on same day that excavation is completed to final grade. Where base of excavations are left open for longer periods, protect them with seal slab or cement-stabilized sand.

- G. Use filter fabric to separate gravel aggregate, and other free draining Class I materials from native soils or select material backfill. Overlap fabric minimum of 12 inches beyond where another material stops contact with soil.
- H. Place gravel aggregate, and other Class I materials, in uniform layers of 8-inch maximum thickness. Perform compaction by means of at least two passes of vibratory compactor.

3.07 FOUNDATION BASE.

- A. Place foundation base after subgrade is properly prepared, including placement of foundation backfill where needed. Use foundation base consisting of 12-inch layer of gravel aggregate. Extend foundation base minimum of 12 inches beyond edge of structure foundation, unless shown otherwise on Drawings.
- B. Where foundation base and foundation backfill are of same material, both can be placed in one operation.

3.08 BACKFILL

- A. Complete backfill to surface of natural ground or to lines and grades shown on Drawings. Remove forms, lumber, trash and debris from structures. Use select fill for backfill. Existing material that qualifies as select material may be used, unless indicated otherwise on Drawings. Deposit backfill in uniform layers and compact each layer as specified.
- B. Do not place backfill against concrete walls or similar structures until laboratory test breaks indicate that concrete has reached minimum of 85 percent of specified compressive strength. Where walls are supported by slabs or intermediate walls, do not begin backfill operations until slab or intermediate walls have been placed and concrete has attained sufficient strength.
- C. Remove concrete forms before starting backfill and remove shoring and bracing as work progresses.
- D. Maintain backfill material at no less than 2 percent below no more than 2 percent above optimum moisture content, unless otherwise approved by Engineer. Place fill material in uniform 8-inch maximum loose layers. Compact fill to at least 95 percent of maximum Standard Proctor Density according to ASTM D 698 below paved areas. Compact fill to at least 95 percent around structures below unpaved areas.
- E. Where backfill is placed against sloped excavation surface, run compaction equipment across boundary of cut slope and backfill to form compacted slope surface for placement of next layer of backfill.

3.09 FIELD QUALITY CONTROL

- A. Testing will be performed.
- B. Tests will be performed initially on minimum of one different sample of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is noticeable change in material gradation or plasticity.
- C. In-place density tests of compacted subgrade and backfill will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at following frequencies and conditions:

1. Minimum of one test for every 50 to 100 cubic yards of compacted backfill material as directed by Engineer.
 2. A minimum of three density tests for each full work shift.
 3. Density tests will be performed in all placement areas.
 4. Number of tests will be increased when inspection determines that soil types or moisture contents are not uniform or when compacting effort is variable and not considered sufficient to attain uniform density.
 5. Identify elevation of test with respect to natural ground.
 6. Record approximate depth of lift tested.
- D. At least one test for moisture-density relationships will be initially performed for each type of backfill material in accordance with ASTM D 698. Perform additional moisture-density relationship test once a month or whenever there is noticeable change in material gradation or plasticity.
- E. When tests indicate work does not meet specified compaction requirements, recondition, re-compact, and retest at Contractor's expense.

END OF SECTION

Section 02317

EXCAVATION AND BACKFILL FOR UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, including manholes and other pipeline structures.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No additional payment will be made for trench excavation, embedment and backfill under this Section. Include cost in the unit price for installed underground piping, sewer, conduit, or duct work.
2. No separate or additional payment will be made for surface water control, ground water control, or for excavation drainage. Include in the unit price for the installed piping, sewer, conduit, or duct work.
3. Concrete Encasement shall be measured and paid for by cubic yard, complete in place. Measurement shall be to the neat lines shown on the plans.

~~4. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. Pipe Foundation: Suitable and stable native soils that are exposed at the trench subgrade after excavation to depth of bottom of the bedding as shown on the Drawings, or foundation backfill material placed and compacted in over-excavations.
- B. Pipe Bedding: The portion of trench backfill that extends vertically from top of foundation up to a level line at bottom of pipe, and horizontally from one trench sidewall to opposite sidewall.
- C. Haunching: The material placed on either side of pipe from top of bedding up to springline of pipe and horizontally from one trench sidewall to opposite sidewall.
- D. Initial Backfill: The portion of trench backfill that extends vertically from springline of pipe (top of haunching) up to a level line 12 inches above top of pipe, and horizontally from one trench sidewall to opposite sidewall.
- E. Pipe Embedment: The portion of trench backfill that consists of bedding, haunching and initial backfill.
- F. Trench Zone: The portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.
- G. Unsuitable Material: Unsuitable soil materials are the following:
 1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.

2. Materials that cannot be compacted to required density due to either gradation, plasticity, or moisture content.
 3. Materials that contain large clods, aggregates, stones greater than 4 inches in any dimension, debris, vegetation, waste or any other deleterious materials.
 4. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- H. Suitable Material: Suitable soil materials are those meeting specification requirements. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement are considered suitable, unless otherwise indicated.
- I. Backfill: Suitable material meeting specified quality requirements, placed and compacted under controlled conditions.
- J. Ground Water Control Systems: Installations external to trench, such as well points, eductors, or deep wells. Ground water control includes dewatering to lower ground water, intercepting seepage which would otherwise emerge from side or bottom of trench excavation, and depressurization to prevent failure or heaving of excavation bottom.
- K. Surface Water Control: Diversion and drainage of surface water runoff and rain water away from trench excavation. Rain water and surface water accidentally entering trench shall be controlled and removed as a part of excavation drainage.
- L. Excavation Drainage: Removal of surface and seepage water in trench by sump pumping and using a drainage layer, as defined in ASTM D 2321, placed on the foundation beneath pipe bedding or thickened bedding layer of Class I material.
- M. Trench Conditions are defined with regard to the stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.
1. Dry Stable Trench: Stable and substantially dry trench conditions exist in pipe embedment zone as a result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.
 2. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.
 - a. Stable Trench with Seepage in Clayey Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.
 - b. Stable Wet Trench in Sandy Soils: Excavation drainage is provided in the embedment zone in combination with ground water control in predominately sandy or silty soils.
 3. Unstable Trench: Unstable trench conditions exist in the pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.
- N. Subtrench: Subtrench is a special case of benched excavation. Subtrench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or

embedment materials directly against undisturbed soils. Depth of a subtrench depends upon trench stability and safety as determined by the Contractor.

- O. Trench Dam: A placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along the trench.
- P. Over-Excavation and Backfill: Excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of foundation as shown on Drawings, and backfilled with foundation backfill material.
- Q. Foundation Backfill Materials: Natural soil or manufactured aggregate of controlled gradation, and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.
- R. Trench Safety Systems include both protective systems and shoring systems.
 - 1. Trench Shield (Trench Box): A portable worker safety structure moved along the trench as work proceeds, used as a protective system and designed to withstand forces imposed on it by cave-in, thereby protecting persons within the trench. Trench shields may be stacked if so designed or placed in a series depending on depth and length of excavation to be protected.
 - 2. Shoring System: A structure that supports sides of an excavation to maintain stable soil conditions and prevent cave-ins, or to prevent movement of the ground affecting adjacent installations or improvements.
 - 3. Special Shoring: A shoring system meeting special shoring as specified in Paragraph 1.08, Special Shoring Design Requirements, for locations identified on the Drawings.

1.04 REFERENCES

- A. ASTM C 12 - Standard Practice for Installing Vitrified Clay Pipe Lines.
- B. ASTM D 558 - Test Methods for Moisture-Density Relations of Soil Cement Mixtures.
- C. ASTM D 698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (304.8-mm) Drop.
- D. ASTM D 1556 - Test Method for Density in Place by the Sand-Cone Method.
- E. ASTM D 2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
- F. ASTM D 2487 - Classification of Soils for Engineering Purposes.
- G. ASTM D 2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D 3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- I. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- J. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.
- K. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

- L. Code of Federal Regulations, 29 CFR Part 1926, Standards-Excavation, Occupational Safety and Health Administration (OSHA).

1.05 SCHEDULING

- A. Schedule work so that pipe embedment can be completed on the same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.

1.06 SUBMITTALS

- A. Conform to Submittal Procedures Section of this Project Manual.
- B. Submit a written description for information only of the planned typical method of excavation, backfill placement and compaction, including:
 - 1. Sequence of work and coordination of activities.
 - 2. Selected trench widths.
 - 3. Procedures for foundation and embedment placement, and compaction.
- C. Submit a ground and surface water control plan in accordance with requirements in this Section.
- D. Submit backfill material sources and product quality information in accordance with requirements of Section 02320 - Utility Backfill Materials.
- E. Submit a trench excavation safety program in accordance with OSHA. Include designs for special shoring meeting the requirements defined in Paragraph 1.08, Special Shoring Design Requirements.
- F. Submit record of location of utilities as installed, referenced to survey control points. Include locations of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts, and gradients.

1.07 TESTS

- A. Testing and analysis of backfill materials for soil classification and compaction during construction will be performed by an independent laboratory.
- B. Perform backfill material source qualification testing in accordance with requirements of Section 02320- Utility Backfill Materials.

1.08 SPECIAL SHORING DESIGN REQUIREMENTS

- A. Have special shoring designed or selected by the Contractor's Professional Engineer to provide support for the sides of the excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities. Special shoring may be a pre-manufactured system selected by the Contractor's Professional Engineer to meet the project site requirements based on the manufacturer's standard design.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Perform excavation with hydraulic excavator or other equipment suitable for achieving the requirements of this Section.
- B. Use only hand-operated tamping equipment until a minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.
- C. Use trench shields or other protective systems or shoring systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.
- D. Use special shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting requirements as specified in Paragraph 1.09, Shoring Design Requirements.

2.02 MATERIAL CLASSIFICATIONS

- A. Embedment and Trench Zone Backfill Materials: Conform to classifications and product descriptions of Section 02320 - Utility Backfill Materials.
- B. Concrete Encasement and Backfill: Conform to requirements for Class B concrete as specified in Section 03315 - Concrete for Utility Construction.
- C. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.
- D. Timber Shoring Left in Place: Untreated oak.

PART 3 EXECUTION**3.01 STANDARD PRACTICE**

- A. Install flexible pipe, including "semi-rigid" pipe, to conform to standard practice described in ASTM D 2321, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.
- B. Install rigid pipe to conform with standard practice described in ASTM C 12, and as described in this Section. Where an apparent conflict occurs between the standard practice and the requirements of this Section, this Section governs.

3.02 PREPARATION

- A. Establish traffic control to conform with Brooks County I.S.D., City and State requirements. Maintain barricades and warning lights for streets and intersections affected by the Work, and is considered hazardous to traffic movements.
- B. Perform work to conform with applicable safety standards and regulations. Employ a trench safety system as required by OSHA.
- C. Immediately notify the agency or company owning any existing utility line which is damaged, broken, or disturbed. Obtain approval from the Resident Project Representative and agency for any repairs or relocations, either temporary or permanent.
- D. Remove existing pavements and structures, including sidewalks and driveways, to conform with requirements of Section 02221 - Removing Existing Pavements and Structures, as applicable.

- E. Install and operate necessary dewatering and surface water control measures.
- F. Maintain permanent benchmarks, monumentation, and other reference points. Unless otherwise directed in writing, replace those which are damaged or destroyed.

3.03 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits and within the grading limits as designated on the Drawings.
- B. Protect and support above-grade and below-grade utilities which are to remain.
- C. Restore damaged permanent facilities to pre-construction conditions unless replacement or abandonment of facilities are indicated on the Drawings.
- D. Take measures to minimize erosion of trenches. Do not allow water to pond in trenches. Where slides, washouts, settlements, or areas with loss of density or pavement failures or potholes occur, repair, recompact, and pave those areas at no additional cost to Owner.

3.04 EXCAVATION

- A. Except as otherwise specified or shown on the Drawings, install underground utilities in open cut trenches with vertical sides. Open cut excavation does not include the use of explosives or headache balls. The use of explosives or headache balls is prohibited.
- B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on the Drawings. Avoid disturbing surrounding ground and existing facilities and improvements.
- C. Determine trench excavation widths using the following schedule as related to pipe outside diameter (O.D.). Maximum trench width shall be the minimum trench width plus 24 inches.

<u>Nominal Pipe Size, Inches</u>	<u>Minimum Trench Width, Inches</u>
Less than 18	O.D. + 18
18 to 30	O.D. + 24
Greater than 30	O.D. + 36

- D. Use sufficient trench width or benches above the embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from the surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.
- E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify the Resident Project Representative and obtain instructions before proceeding.
- F. Shoring of Trench Walls.
 - 1. Install Special Shoring in advance of trench excavation or simultaneously with the trench excavation, so that the soils within the full height of the trench excavation walls will remain laterally supported at all times.

2. For all types of shoring, support trench walls in the pipe embedment zone throughout the installation. Provide trench wall supports sufficiently tight to prevent washing the trench wall soil out from behind the trench wall support.
 3. Unless otherwise directed by the Engineer, leave sheeting driven into or below the pipe embedment zone in place to preclude loss of support of foundation and embedment materials. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and the trench wall in the vicinity of the pipe zone.
 4. Employ special methods for maintaining the integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
 5. If sheeting or other shoring is used below top of the pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into the embedment zone shall be the equivalent of a 1-inch-thick steel plate. Fill voids left on removal of supports with compacted backfill material.
- G. Use of Trench Shields. When a trench shield (trench box) is used as a worker safety device, the following requirements apply:
1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to the trench sidewalls.
 2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor the degree of compaction reduced.
 3. When required, place, spread, and compact pipe foundation and bedding materials beneath the shield. For backfill above bedding, lift the shield as each layer of backfill is placed and spread. Place and compact backfill materials against undisturbed trench walls and foundation.
 4. Maintain trench shield in position to allow sampling and testing to be performed in a safe manner.

3.05 HANDLING EXCAVATED MATERIALS

- A. Use only excavated materials which are suitable as defined in this Section and conforming with Section 02320 - Utility Backfill Materials. Place material suitable for backfilling in stockpiles at a distance from the trench to prevent slides or cave-ins.
- B. When required, provide additional backfill material conforming with requirements of Section 02320 - Utility Backfill Materials.
- C. Do not place stockpiles of excess excavated materials on streets and adjacent properties. Protect excess stockpiles for use on site.

3.06 GROUND WATER CONTROL

- A. Implement ground water control if needed. Provide a stable trench to allow installation in accordance with the Specifications.

3.07 TRENCH FOUNDATION

- A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.
- B. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.08 PIPE EMBEDMENT, PLACEMENT, AND COMPACTION

- A. Immediately prior to placement of embedment materials, the bottoms and sidewalls of trenches shall be free of loose, sloughing, caving, or otherwise unsuitable soil.
- B. Place embedment including bedding, haunching, and initial backfill as shown on Drawings.
- C. For pipe installation, manually spread embedment materials around the pipe to provide uniform bearing and side support when compacted. Do not allow materials to free-fall from heights greater than 24 inches above top of pipe. Perform placement and compaction directly against the undisturbed soils in the trench sidewalls, or against sheeting which is to remain in place.
- D. Do not place trench shields or shoring within height of the embedment zone unless means to maintain the density of compacted embedment material are used. If moveable supports are used in embedment zone, lift the supports incrementally to allow placement and compaction of the material against undisturbed soil.
- E. Place geotextile to prevent particle migration from the in-situ soil into open-graded (Class I) embedment materials or drainage layers.
- F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.
- G. Place haunching material manually around the pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside the pipe with sand bags or other suitable means.
- H. Place electrical conduit, if used, directly on foundation without bedding.
- I. Shovel in-place and compact embedment material using pneumatic tampers in restricted areas, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted areas. Compact each lift before proceeding with placement of next lift. Neither water tamping nor jetting are allowed.
- J. For water line construction embedment, use bank run sand, concrete sand, gem sand, pea gravel, or crushed limestone as specified in Section 02320 - Utility Backfill Material.
- K. Place trench dams in Class I embedments in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.
- L. The Contractor shall provide whatever means and materials are required to prevent pipe flotation at no separate pay.

3.09 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

- A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only the minimum length of trench open as necessary for construction.

- B. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave the sheeting in place. Cut off sheeting 1.5 feet or more above the crown of the pipe. Remove trench supports within 5 feet from the ground surface.
- C. When shown on Drawings, a random backfill of suitable material may be used in trench zone for trench excavations outside pavements.
- D. Place trench zone backfill in lifts and compact by methods selected by the Contractor. Fully compact each lift before placement of the next lift.
 - 1. Bank run sand.
 - a. Maximum 9-inches compacted lift thickness.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 3 percent of optimum determined according to ASTM D 698
 - 2. Cement-stabilized sand.
 - a. Maximum lift thickness determined by Contractor to achieve uniform placement and required compaction, but not exceeding 24 inches.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 558.
 - c. Moisture content on the dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.
 - 3. Select fill.
 - a. Maximum 6-inches compacted lift thickness.
 - b. Compaction by equipment providing tamping or kneading impact to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 2 percent of optimum determined according to ASTM D 698.
- E. For trench excavations outside pavements, a random backfill of suitable material may be used in the trench zone.
 - 1. Fat clays (CH) may be used as trench zone backfill outside paved areas at the Contractor's option. If the required density is not achieved, the Contractor, at his option and at no additional cost to the Owner, may use lime stabilization to achieve compaction requirements or use a different suitable material.
 - 2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.
 - 3. Compact to a minimum of 90 percent of the maximum dry density determined according to ASTM D 698.
 - 4. Moisture content as necessary to achieve density.

- F. Concrete encasement shall be placed at locations shown on the drawings and as directed by the Resident Project Representative.
- G. For electric conduits, remove form work used for construction of conduits before placing trench zone backfill.

3.10 MANHOLES, JUNCTION BOXES, AND OTHER PIPELINE STRUCTURES

- A. Meet the requirements of adjoining utility installations for backfill of pipeline structures, as shown on the Drawings.

3.11 FIELD QUALITY CONTROL

- A. Test for material source qualifications as defined in Section 02320 - Utility Backfill Materials.
- B. Provide excavation and trench safety systems at locations and to depths required for testing and retesting during construction at no additional cost to Owner.
- C. Tests will be performed on a minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.
- D. At least three tests for moisture-density relationships will be performed initially for backfill materials in accordance with ASTM D 698, and for cement- stabilized sand in accordance with ASTM D 558. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.
- E. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions.
 - 1. A minimum of one test for every 100 Linear feet of trench of compacted embedment and compacted trench zone backfill material.
 - 2. A minimum of three density tests for each full shift of Work.
 - 3. Density tests will be distributed among the placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.
 - 4. The number of tests will be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.
 - 5. Density tests may be performed at various depths below the fill surface by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.
 - 6. Two verification tests will be performed adjacent to in-place tests showing density less than the acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.
 - 7. Recompacted placement will be retested at the same frequency as the first test series, including verification tests.

- F. Recondition, recompact, and retest at Contractor's expense if tests indicate Work does not meet specified compaction requirements. For hardened soil cement with non-conforming density, core and test for compressive strength at Contractor's expense.
- G. Acceptability of crushed rock compaction will be determined by inspection.

3.12 DISPOSAL OF EXCESS MATERIAL

- A. Dispose of excess materials in accordance with requirements of Waste Material Disposal

END OF SECTION

Section 02320

UTILITY BACKFILL MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Material Classifications.
- B. Utility Backfill Materials:
 - Concrete sand
 - Gem sand
 - Pea gravel
 - Crushed stone
 - Crushed concrete
 - Bank run sand
 - Select backfill
 - Random backfill
- C. Material Handling and Quality Control Requirements.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No payment will be made for backfill material under this Section. Include payment in unit price for applicable utility installation.~~
- ~~2. Payment for backfill material, when included as a separate pay item, is on a cubic yard basis for material placed and compacted within theoretical trench width limits and thickness of material according to Drawings.~~
- ~~3. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. Unsuitable Material: Unsuitable soil materials are the following:
 - 1. Materials that are classified as ML, CL-ML, MH, PT, OH, and OL according to ASTM D 2487.
 - 2. Materials that cannot be compacted to the required density due to either gradation, plasticity, or moisture content.
 - 3. Materials that contain large clods, aggregates, or stones greater than 4 inches in any dimension; debris, vegetation, and waste; or any other deleterious materials.
 - 4. Materials that are contaminated with hydrocarbons or other chemical contaminants.
- B. Suitable Material: Suitable soil materials are the following:
 - 1. Those meeting specification requirements.

2. Unsuitable soils meeting specification requirements for suitable soils after treatment with lime or cement.
- C. Foundation Backfill Materials: Natural soil or manufactured aggregate meeting Class I A requirements and geotextile filter fabrics as required, to control drainage and material separation. Foundation backfill material is placed and compacted as backfill where needed to provide stable support for the structure foundation base. Foundation backfill materials may include concrete fill and seal slabs.
- D. Foundation Base: Crushed stone aggregate with filter fabric as required, cement stabilized sand, or concrete seal slab. The foundation base provides a smooth, level working surface for the construction of the concrete foundation.
- E. Backfill Material: Classified soil material meeting specified quality requirements for the designated application as embedment or trench zone backfill.
- F. Embedment Material: Soil material placed under controlled conditions within the embedment zone extending vertically upward from top of foundation to an elevation 12 inches above top of pipe, and including pipe bedding, haunching, and initial backfill.
- G. Trench Zone Backfill: Classified soil material meeting specified quality requirements and placed under controlled conditions in the trench zone from top of embedment zone to base course in paved areas or to the surface grading material in unpaved areas.
- H. Foundation: Either suitable soil of the trench bottom, or material placed as backfill of over-excavation for removal and replacement of unsuitable or otherwise unstable soils.
- I. Source: A source selected by the Contractor for supply of embedment or trench zone backfill material. A selected source may be the project excavation, off-site borrow pits, commercial borrow pits, or sand and aggregate production or manufacturing plants.
- J. Refer to Section 02317 - Excavation and Backfill for Utilities for other definitions regarding utility installation by trench construction.

1.04 REFERENCES

- A. ASTM C 33 - Specification for Concrete Aggregate.
- B. ASTM C 40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
- C. ASTM C 123 - Test Method for Lightweight Pieces in Aggregate.
- D. ASTM C 131 - Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- E. ASTM C 136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- F. ASTM C 142 - Test Method for Clay Lumps and Friable Particles in Aggregates.
- G. ASTM D 1140 - Test Method for Amount of Materials in Soils Finer Than No. 200 Sieve.
- H. ASTM D 2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
- I. ASTM D 2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

- J. ASTM D 4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- K. ASTM D 4643 - Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
- L. TxDOT Tex-101-E - Preparation of Soil and Flexible Base Materials for Testing.
- M. TxDOT Tex-104-E - Test Method for Determination of Liquid Limit of Soils (Part 1)
- N. TxDOT Tex-106-E - Test Method - Methods of Calculating Plasticity Index of Soils.
- O. TxDOT Tex-110-E - Determination of Particle Size Analysis of Soils.

1.05 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit a description of source, material classification and product description, production method, and application of backfill materials.
- C. Submit test results for samples of off-site backfill materials to comply with Paragraph 2.03, Materials Testing.
- D. Before stockpiling materials, submit a copy of temporary easement or approval from landowner for stockpiling backfill material on private property.
- E. For each delivery of material, provide a delivery ticket which includes source location.

1.06 TESTS

- A. Perform tests of sources for backfill material in accordance with Paragraph 2.03.
- B. Verification tests of backfill materials may be performed by the Owner in accordance with Paragraph 3.03.
- C. Random fill obtained from the project excavation as source is exempt from pre-qualification requirements by Contractor but must be inspected by Owner's testing lab for unacceptable materials based on ASTM D 2488.

PART 2 P R O D U C T S

2.01 MATERIAL CLASSIFICATIONS

- A. Materials for backfill shall be classified for the purpose of quality control in accordance with the Unified Soil Classification Symbols as defined in ASTM D 2487. Material use and application is defined in utility installation specifications and Drawings either by class, as described in Paragraph 2.01B, or by product descriptions, as given in Paragraph 2.02.
- B. Class Designations Based on Laboratory Testing:
 - 1. Class IA. Class IA materials shall be manufactured aggregates with an open graduation. Materials shall consist of angular, crushed stone or rock, or crushed gravel. Class IA embedment material shall have a large void content and contain little or no fines. 100% of the material shall pass a 1 ½ " sieve, up to 10% shall pass a No. 4 sieve, and no more than 5% shall pass a No. 200 sieve. Class IA materials used for foundation, replacement of over-

excavation, or in the pipe embedment zone shall be wrapped in one layer of geotextile filter cloth when groundwater is present in the excavated trench and the trench walls in the pipe embedment zone are composed of fine granular soils. Filter cloth shall be Poly-Filter GB, Nicolon 70/20, or Nicolon 40/30A.

2. Class IB. Class IB materials shall be manufactured / processed aggregates with a dense gradation. Materials shall consist of angular, crushed stone (or other Class IA materials) and stone/sand mixtures and contain little or no fines. 100% of the material shall pass a 1 ½ " sieve, up to 50% shall pass a No. 4 sieve, and no more than 5% shall pass a No. 200 sieve.
3. Class II. Class II materials shall be clean, coarse-grained soils classified as GW, GP, SW, or SP soil groups under ASTM D 2487 or coarse-grained soils which are borderline clean to with fines classified as GW-GC or SP-SM under ASTM D 2487. 100% of the GW, GP, SW, SP, GW-CC, and SP-SM soils shall pass a 1 ½ " sieve. Up to 50% of the GW and GP coarse fraction (material retained on a No. 200 sieve) shall pass a No. 4 sieve. Up to 5% of the GW, GP, SW, and SP soils shall pass a No. 200 sieve. Between 5% and 12% of the GW-CC and SP-SM soils shall pass a No. 200 sieve.
4. Class III. Class III materials shall be coarse-grained soils with fines. The soils shall be classified as GM, GC, SM, or SC soil groups under ASTM D 2487. 100% of the GM, GC, SM, and SC soils shall pass a 1 ½ " sieve. Up to 50% of the GM and GC coarse fractions (material retained on a No. 200 sieve) shall pass a No. 4 sieve. At least 50% of the SM and SC coarse fractions shall pass a No. 4 sieve. Between 12% and 50% of the GM, GC, SM, and SC soils shall pass a No. 200 sieve.

2.02 PRODUCT DESCRIPTIONS

- A. Soils classified as silt (ML), elastic silt (MH), organic clay and organic silt (OL, OH), and organic matter (PT) are not acceptable as backfill materials. These soils may be used for site grading and restoration in unimproved areas as approved by the Resident Project Representative. Soils in Class IVB, fat clay (CH) may be used as backfill materials where allowed by the applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
- B. Provide backfill material that is free of stones greater than 6 inches, free of roots, waste, debris, trash, organic material, unstable material, non-soil matter, hydrocarbon or other contamination, conforming to the following limits for deleterious materials:
 1. Clay lumps: Less than 0.5 percent for Class I, and less than 2.0 percent for Class II, when tested in accordance with ASTM C 142.
 2. Lightweight pieces: Less than 5 percent when tested in accordance with ASTM C 123.
 3. Organic impurities: No color darker than standard color when tested in accordance with ASTM C 40.
- C. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in the product specification, and approved by Engineer, provided that the physical property criteria are determined to be satisfactory by testing.
- D. Bank Run Sand: Durable bank run sand classified as SP, SW, or SM by the Unified Soil Classification System (ASTM D 2487) meeting the following requirements:
 1. Less than 15 percent passing the number 200 sieve when tested in accordance with ASTM D 1140. The amount of clay lumps or balls not exceeding 2 percent.

2. Material passing the number 40 sieve shall meet the following requirements when tested in accordance with ASTM D 4318:
- Liquid limit: not exceeding 25 percent.
 - Plasticity index: not exceeding 7.
- E. Concrete Sand: Natural sand, manufactured sand, or a combination of natural and manufactured sand conforming to the requirements of ASTM C 33 and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	100
No. 4	95 to 100
No. 8	80 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

- F. Gem Sand: Sand conforming to the requirements of ASTM C 33 for course aggregates specified for number 8 size and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
3/8"	95 to 100
No. 4	60 to 80
No. 8	15 to 40

- G. Pea Gravel: Durable particles composed of small, smooth, rounded stones or pebbles and graded within the following limits when tested in accordance with ASTM C 136:

Sieve	Percent Passing
1/2"	100
3/8"	85 to 100
No. 4	10 to 30
No. 8	0 to 10
No. 16	0 to 5

- H. Crushed Aggregates: Crushed aggregates consist of durable particles obtained from an approved source and meeting the following requirements:

1. Materials of one product delivered for the same construction activity from a single source.
2. Non-plastic fines.
3. Los Angeles abrasion test wear not exceeding 45 percent when tested in accordance with ASTM C 131.
4. Crushed aggregate shall have a minimum of 90 percent of the particles retained on the No. 4 sieve with 2 or more crushed faces as determined by Test Method Tex-460-A, Part I.
5. Crushed stone: Produced from oversize plant processed stone or gravel, sized by crushing to predominantly angular particles from a naturally occurring single source. Uncrushed gravel are not acceptable materials for embedment where crushed stone is shown on the applicable utility embedment drawing details.
6. Crushed Concrete: Crushed concrete is an acceptable substitute for crushed stone as utility backfill. Gradation and quality control test requirements are the same as crushed stone. Provide crushed concrete produced from normal weight concrete of uniform quality; containing particles of aggregate and cement material, free from other substances such as asphalt, reinforcing steel fragments, soil, waste gypsum (calcium sulfate), or debris.
7. Gradations, as determined in accordance with Tex-110-E.

Sieve	Percent Passing by Weight for Pipe Embedment by Ranges of Nominal Pipes Sizes		
	>15"	15" - 8"	<8"
1"	95 - 100	100	-
3/4"	60 - 90	90 - 100	100
1/2"	25 - 60	-	90 - 100
3/8"	-	20 - 55	40 - 70
No. 4	0 - 5	0 - 10	0 - 15
No. 8	-	0 - 5	0 - 5

- I. Select Backfill: Class III clayey gravel or sand or Class IV lean clay with a plasticity index between 7 and 20.
- J. Random Backfill: Any suitable soil or mixture of soils within Classes I, II, III and IV; or fat clay (CH) where allowed by the applicable backfill installation specification. Refer to Section 02316 - Excavation and Backfill for Structures and Section 02317 - Excavation and Backfill for Utilities.
- K. Cement Stabilized Sand: Conform to requirements of Section 02321 - Cement Stabilized Sand.
- L. Concrete Backfill: Conform to Class B concrete as specified in Section 03315 - Concrete for Utility Construction.

2.03 MATERIALS TESTING

- A. Ensure that material selected, produced and delivered to the project meets applicable specifications and is of sufficient uniform properties to allow practical construction and quality control.
- B. Source or Supplier Qualification. Perform testing, or obtain representative tests by suppliers, for selection of material sources and products. Provide test results for a minimum of three samples for each source and material type. Tests samples of processed materials from current production representing material to be delivered. Tests shall verify that the materials meet specification requirements. Repeat qualification test procedures each time the source characteristic changes or there is a planned change in source location or supplier. Qualification tests shall include, as applicable:
 - 1. Gradation. Complete sieve analyses shall be reported regardless of the specified control sieves. The range of sieves shall be from the largest particle through the No. 200 sieve.
 - 2. Plasticity of material passing the No. 40 sieve.
 - 3. Los Angeles abrasion wear of material retained on the No. 4 sieve.
 - 4. Clay lumps.
 - 5. Lightweight pieces
 - 6. Organic impurities
- C. Production Testing. Provide reports to the Engineer from an independent testing laboratory that backfill materials to be placed in the Work meet applicable specification requirements.
- D. Deliver material samples for verification testing to the site of the Work.

PART 3 EXECUTION

3.01 SOURCES

- A. Use of material encountered in the trench excavations is acceptable, provided applicable specification requirements are satisfied. If excavation material is not acceptable, provide from other approved source.
- B. Identify off-site sources for backfill materials at least 14 days ahead of intended use and deliver samples for verification testing to the site of the Work.
- C. Obtain approval for each material source by the Engineer before delivery is started. If sources previously approved do not produce uniform and satisfactory products, furnish materials from other approved sources. Materials may be subjected to inspection or additional verification testing after delivery. Materials which do not meet the requirements of the specifications will be rejected. Do not use material which, after approval, has become unsuitable for use due to segregation, mixing with other materials, or by contamination. Once a material is approved by the Engineer, expense for sampling and testing required to change to a different material will be credited to the Owner through a change order.
- D. Bank run sand, select backfill, and random backfill, if available in the project excavation, may be obtained by selective excavation and acceptance testing. Obtain additional quantities of these materials and other materials required to complete the work from off-site sources.
- E. The Owner does not represent or guarantee that any soil found in the excavation work will be suitable or acceptable as backfill material.

3.02 MATERIAL HANDLING

- A. When backfill material is obtained from either a commercial or non-commercial borrow pit, open the pit to expose the vertical faces of the various strata for identification and selection of approved material to be used. Excavate the selected material by vertical cuts extending through the exposed strata to achieve uniformity in the product.
- B. Establish temporary stockpile locations for practical material handling and control, and verification testing in advance of final placement. Obtain approval from landowner for storage of backfill material on adjacent private property.
- C. When stockpiling backfill material near the project site, use appropriate covers to eliminate blowing of materials into adjacent areas and prevent runoff containing sediments from entering the drainage system.
- D. Place stockpiles in layers to avoid segregation of processed materials. Load material by making successive vertical cuts through entire depth of stockpile.

3.03 FIELD QUALITY CONTROL

- A. Quality Control
 - 1. The Resident Project Representative may sample and test backfill at:
 - a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
 - b. On-site stockpiles.
 - c. Materials placed in the Work.
 - 2. The Resident Project Representative may resample material at any stage of work or location if changes in characteristics are apparent.
- B. Production Verification Testing: The project testing laboratory will provide verification testing on backfill materials, as directed by the Resident Project Representative. Samples may be taken at the source or at the production plant, as applicable.

END OF SECTION

Section 02330

EMBANKMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction of embankments with excess excavated material and borrow.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No separate payment will be made for material embankment under this section. Include payment in unit price for excavation or borrow.~~

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM D 698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- B. ASTM D 2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- C. ASTM D 3017 – Standard Test Method for Water content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to Section 02315 – Roadway Excavation for acceptable excess materials from roadway excavation.
- B. Refer to Section 02317 – Excavation and Backfill For Utilities for acceptable excess materials from utility excavation and trenching.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify borrow and excess excavated materials to be reused are approved.
- B. Verify removals and clearing and grubbing operations have been completed.

3.02 PREPARATION

- A. Backfill tests pits, stump holes, small swales and other surface irregularities. Backfill and compact in designated lift depths to requirements for embankment compaction.

- B. Record location and plug and fill inactive water and oil wells. Conform to Texas State Health Department, Texas Commission on Environmental Quality and Texas Railroad Commission requirements. Notify Project Manager prior to plugging wells.
- C. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02316 – Excavation and Backfill for Structures and Section 02320 – Utility Backfill Materials.
- D. Backfill new utilities below future grade. Conform to requirements of each respective section.

3.03 PROTECTION

- A. Protect trees, shrubs, lawns, existing structures, and other features outside of embankment limits.
- B. Protect utilities above and below grade, which are to remain.
- C. Conform to protection requirements of Section 02315 – Roadway Excavation.

3.04 PLACING EMBANKMENT

- A. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed 3 percent of optimum moisture content. Contractor may manipulate wet material to facilitate drying, by disking or windrowing.
- B. Do not place embankment fill until density and moisture content of previously placed material comply with the specified requirements.
- C. Scarify areas to be filled to minimum depth of 4 inches to bond existing and new materials. Mix with first fill layer.
- D. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Extend each layer across full width of fill.
- E. Each layer shall be homogenous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.
- F. Layers shall not exceed the following compacted thickness:
 - 1. Areas indicated to be under future paving or shoulders, to be constructed within 6 months: 6 inches when compacted with pneumatic rollers, or 8 inches when compacted with other rollers.
 - 2. Other areas: 12 inches
- G. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to level of each bench.
- H. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of 4 inches and recompact with next fill layer.
- I. Construct to lines and grades shown on Drawings.
- J. Remove unsuitable material and excess soil not being used for embankment from site in accordance with requirements of Section 01576 – Waste Material Disposal.

- K. Maintain moisture content of embankment materials to attain required density.
- L. Compact to following minimum densities at moisture content of optimum to 3 percent above optimum as determined by ASTM D 698, unless otherwise indicated on Drawings:
 - 1. Areas under future paving and shoulders: Minimum density of 95 percent of maximum dry density.
 - 2. Other areas: Minimum density of 90 percent of maximum dry density.

3.05 TOLERANCES

- A. Top of Compacted Surface: Plus or minus 1/2 inch in cross section or 16 foot length.

3.06 FIELD QUALITY CONTROL

- A. Compaction testing will be performed in accordance with ASTM D 698 or ASTM D 2922 and ASTM D 3017 under provisions of Section 01454 - Testing Laboratory Services.
- B. A minimum of three tests will be taken for each 1000 linear feet per lane of roadway or 500 square yards of embankment per lift.
- C. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at no additional cost to the Owner.

END OF SECTION

SECTION 02362

TERMITE CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Soil treatment for termite control.
- B. Related Sections:
 - 1. Section 02055 - Soils for Earthwork: Backfill materials.
 - 2. Section 02315 - Excavation and Fill: Subgrade preparation.
 - 3. Section 03300 - Cast-In-Place Concrete: Slabs on grade and foundations placed over treated soil.

1.2 REFERENCES

- A. Environmental Protection Agency:
 - 1. EPA FIFRA - Federal Insecticide, Fungicide and Rodenticide Act.
- B. National Pest Management Association:
 - 1. NPMA WDO - Wood Destroying Organism Library.

1.3 SUBMITTALS

- A. Product Data: Submit toxicants to be used, composition by percentage, dilution schedule, intended application rate. Include product label information.
- B. Test Reports: Indicate regulatory agency approval reports.
- C. Manufacturer's Application Instructions: Indicate caution requirements and in accordance with current product label of chosen pesticide.
- D. Certify applications followed NPMA WDO for termite control or other regional location guidance.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record moisture content of soil before application, date and rate of application, areas of application, diary of toxicity meter readings and corresponding soil coverage.
- B. Operation and Maintenance Data: Indicate re-treatment schedule.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the Work of this section and licensed in State of Texas.

1.6 SEQUENCING

- A. Section 01100 - Summary: Work sequence.
- B. Apply toxicant immediately prior to installation of vapor barrier under slabs-on-grade in accordance with product label supplemented by the NPCA's ARP for termiticiding or local requirements.

1.7 WARRANTY

- A. Warranty: Include coverage for damage and repairs to building and building contents caused by termites. Repair damage. Re-treat where required.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Toxicant Chemical: EPA FIFRA approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.

2.2 MIXES

- A. Mix toxicant to manufacturer's instructions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- C. Verify final grading and excavation are complete.

3.2 APPLICATION

- A. Apply toxicant at locations indicated in Schedule at end of section.
- B. Apply extra treatment to structure penetration surfaces including pipe or ducts, and soil penetrations including grounding rods or posts.
- C. Re-treat disturbed treated soil with same toxicant as original treatment.
- D. When inspection or testing identifies presence of termites, re-treat soil and re-test.

3.3 PROTECTION OF FINISHED WORK

- A. Section 01700 - Execution Requirements: Protecting finished Work.
- B. Do not permit soil grading over treated work.

END OF SECTION

Section 02506

POLYVINYL CHLORIDE PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Polyvinyl chloride (PVC) pressure pipe for water distribution and sanitary sewer force mains in nominal diameters 4 inches through 16 inches.
- B. Polyvinyl chloride sewer pipe for gravity sanitary sewers in nominal diameters 4 inches through 48 inches.
- C. Polyvinyl chloride pressure pipe for gravity sanitary sewers and force mains in nominal diameters 4 inches through 36 inches.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

~~1. No separate payment will be made for PVC pipe under this section. Include cost in unit price for work included as specified in the following sections:~~

~~a. Section 02511 - Water Main~~

~~b. Section 02531 - Gravity Sanitary Sewers~~

~~c. Section 02532 - Sanitary Sewer Force Mains~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ANSI A21.5 (AWWA C 105) - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
- B. ANSI A21.10 (AWWA C 110) - Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches for Water and Other Liquids.
- C. ANSI A21.11 (AWWA C 111) - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- D. ASTM D 1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
- E. ASTM D 1784 - Standard Specification for Rigid Polyvinyl Chloride Compound and Chlorinated Polyvinyl Chloride Compounds.
- F. ASTM D 2241 - Standard Specification for Polyvinyl Chloride Plastic Pipe (SDR-PR).
- G. ASTM D 2321 - Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.

- H. ASTM D 2444 - Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
- I. ASTM D 3034 - Specification for Type PSM Polyvinyl Chloride Sewer Pipe and Fittings.
- J. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- K. ASTM D 3212 - Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
- L. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- M. ASTM F 679 - Specification for Polyvinyl Chloride Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- N. ASTM F 794 - Specification for Polyvinyl Chloride Large-Diameter Ribbed Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
- O. AWWA C 909 - Polyvinyl Chloride Pressure Pipe, 4 Inches Through 12 Inches for Water Distribution.
- P. AWWA C 905 - Polyvinyl Chloride Water Transmission Pipe, Nominal Diameters 14 Inches Through 36 Inches.
- Q. UNI-B-11 - Recommended Standard Specification for Polyvinyl Chloride Water Transmission Pipe (Nominal Diameters 14 Inches through 36 Inches).
- R. UNI-B-13 - Recommended Standard Performance Specification for Joint Restraint Devices for Use with Polyvinyl Chloride Pipe.

1.04 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit shop drawings showing design of new pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

1.05 QUALITY CONTROL

- A. Submit manufacturer's certifications that PVC pipe and fittings meet requirements of this Section and AWWA C 900 or AWWA C 905 for pressure pipe applications, or the appropriate ASTM standard specified for gravity sewer pipe.
- B. Submit manufacturer's certification that PVC pressure pipe has been hydrostatically tested at the factory in accordance with AWWA C 900 or AWWA C 909 and this Section.
- C. When foreign manufactured material is proposed for use, have material tested for conformance to applicable ASTM requirements by certified independent testing laboratory located in United States. Certification from any other source is not acceptable. Furnish copies of test reports to Engineer for review. Cost of testing shall be borne by Contractor.

PART 2 PRODUCTS

2.01 MATERIAL

- A. Use PVC compounds in the manufacture of pipe that contain no ingredient in an amount that has been demonstrated to migrate into water in quantities considered to be toxic.
- B. Furnish PVC pressure pipe manufactured from Class 12454-B virgin PVC compounds as defined in ASTM D 1784. Provide pipe which is homogeneous throughout, free of voids, cracks, inclusions, and other defects, uniform as commercially practical in color, density, and other physical properties. Deliver pipe with surfaces free from nicks and scratches with joining surfaces of spigots and joints free from gouges and imperfections which could cause leakage.
- C. For PVC pressure pipe used for water mains, provide self-extinguishing PVC pipe that bears Underwriters' Laboratories' mark of approval and is acceptable without penalty to Texas State Fire Insurance Committee for use in fire protection lines.
- D. Gaskets:
 - 1. Gaskets shall meet the requirements of ASTM F 477. Use elastomeric factory-installed gaskets to make joints flexible and watertight.
- E. Lubricant for rubber-gasketed joints: Water soluble, non-toxic, non-objectionable in taste and odor imparted to fluid, non-supporting of bacteria growth, having no deteriorating effect on PVC or rubber gaskets.
- F. PVC pipe for water service shall bear National Sanitation Foundation Seal of Approval (NSF-PW).

2.02 WATER SERVICE PIPE

- A. Pipe 4-inch through 12-inch: AWWA C 909, Class 150, DR 18; nominal 20-foot lengths; cast-iron equivalent outside diameters.
- B. Pipe 16-inch: AWWA C 905; Class 235; DR 18; nominal 20-foot lengths; cast-iron equivalent outside diameter.
- C. Joints: ASTM D 3139; push-on type joints in integral bell or separate sleeve couplings. Do not use socket type or solvent weld type joints.
- D. Make curves and bends by deflecting the joints. Do not exceed maximum deflection recommended by the pipe manufacturer. Submit details of other methods of providing curves and bends for review by Engineer.
- E. Hydrostatic Test: AWWA C 909, AWWA C 905, ANSI A 21.10 (AWWA C 110); at point of manufacture; submit manufacturer's written certification.
- F. Detectable underground warning tape shall be 3" wide Magna Tec or approved equal.

2.03 BENDS AND FITTINGS FOR PVC PRESSURE PIPE

- A. Bends and Fittings: Conform to the requirements of Item 02501 – Ductile Iron Pipe and Fittings.

2.04 GRAVITY SANITARY SEWER PIPE

- A. PVC gravity sanitary sewer pipe shall be in accordance with the provisions in the following table:

WALL CONSTRUCTION	ASTM DESIGNATION	SDR (Max.)/ STIFFNESS (Min.)	DIAMETER SIZE RANGE
Solid	D3034	SDR 26 / PS 115	6" to 15"
	D3034	SDR 35 / PS 46	6" to 15"
	F679	SDR 35 / PS 46	18" to 27"
	AWWA C909	DR 18 / N/A	4" to 12"
	AWWA C905	DR 18 / N/A	14" to 36"
Profile	F794	N/A / 46 psi	12" TO 48"
	F794	N/A / 46 psi	21" TO 48"

- B. When solid wall PVC pipe 18 inches to 27 inches in diameter is required in SDR 26, provide pipe conforming to ASTM F 679, except provide wall thickness as required for SDR 26 and pipe strength of 115 psi.
- C. For sewers up to 12-inch-diameter crossing over waterlines, or crossing under waterlines with less than 2 feet separation, provide minimum 150 psi pressure-rated pipe conforming to ASTM D 2241 with suitable PVC adapter couplings for a minimum of 10 feet each direction from the waterline.
- D. Joints: Spigot and integral wall section bell with solid cross section elastomeric or rubber ring gasket conforming to requirements of ASTM D 3212 and ASTM F 477, or ASTM D 3139 and ASTM F 477. Gaskets shall be factory-assembled and securely bonded in place to prevent displacement. The manufacturer shall test a sample from each batch conforming to requirements ASTM D 2444.
- E. Fittings: Provide PVC gravity sewer sanitary bends, tee, or wye fittings for new sanitary sewer construction. PVC pipe fittings shall be full-bodied, either injection molded or factory fabricated. Saddle-type tee or wye fittings are not acceptable.

2.05 ~~SANITARY SEWER FORCE MAIN PIPE~~

- ~~A. Provide PVC pressure pipe conforming to the requirements for water service pipe, and conforming to the minimum working pressure rating specified in Section 02532 - Sanitary Sewage Force Mains.~~
- ~~B. Acceptable pipe joints are integral bell and spigot, containing a bonded-in elastomeric sealing ring meeting the requirements of ASTM F 477. In designated areas requiring restrained joint pipe and fittings, use EBAA Iron Series 2000PV, Uniflange Series 1350 restrainer, or equal joint restraint device conforming to UNI-B-13, for PVC pipe 12-inch diameter and less.~~
- ~~C. Fittings: Provide ductile iron fittings as per Paragraph 2.03, except furnish fittings with one of the following internal linings:~~
- ~~1. Nominal 40 mils (35 mils minimum) virgin polyethylene complying with ASTM D 1248, heat fused to the interior surface of the fitting, as manufactured by American Cast Iron Pipe "Polybond", or U.S. Pipe "Polyline".~~
 - ~~2. Nominal 40 mils (35 mils minimum) polyurethane, Corro-pipe II by Madison Chemicals, Inc.~~

- ~~3. Nominal 40 mils (35 mils minimum) ceramic epoxy, Protecto 401 by Enduron Protective Coatings.~~
- ~~D. Exterior Protection: Provide polyethylene wrapping of ductile iron fittings as required by Section 02528 Polyethylene Wrap.~~
- ~~E. Hydrostatic Tests: Hydrostatically test pressure rated pipe in accordance with Paragraph 2.02E.~~

PART 3 EXECUTION

3.01 PROTECTION

- A. Store pipe under cover out of direct sunlight and protect from excessive heat or harmful chemicals in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

- A. Conform to requirements of Section 02511 - Water Mains, Section 02531 - Gravity Sanitary Sewers, and Section 02532 - Sanitary Sewage Force Mains, as applicable.
- B. Install PVC pipe in accordance with Section 02317 - Excavation and Backfill for Utilities, ASTM D 2321, and manufacturer's recommendations.
- C. Water service pipe 12 inches in diameter and smaller: Installed to clear utility lines and have minimum 4 feet of cover below lowest property line grade of street, unless otherwise required by Drawings.
- D. Avoid imposing strains that will overstress or buckle the pipe when lowering pipe into trench.
- E. Install 3" wide detectable warning tape approximately 24" below the finished surface above all pipe runs.

END OF SECTION

Section 02512

WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tapping mains and furnishing and installing new service lines for water.
- B. Relocation of existing small water meters.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. Payment for water connections is on a per each basis for each installation.~~

~~2. Payment for each meter includes labor, materials, and equipment to relocate the existing meter.~~

~~3. No additional payment will be made for bedding, backfill, compaction, etc.~~

~~4. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 800 - Underground Service Line Valves and Fittings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide water service as shown on the Drawings.

PART 3 EXECUTION

3.01 APPLICATION

- A. Set service connections at right angles to proposed meter location.
- B. Use tapping machine manufactured for pressure tapping purposes for 2-inch and smaller service taps on pressurized water mains.
- C. Install service lines in open-cut trench in accordance with Section 02317 - Excavation and Backfill for Utilities except that service lines specifically indicated on Drawings shall be augered in accordance with Drawings.
- D. Lay service lines with minimum of 30 inches of cover as measured from top of curb or, in absence of curbs, from centerline elevation of crowned streets or roads. Provide minimum of 18 inches of cover below flow line of ditches to service lines.
- E. Maintain service lines free of dirt and foreign matter.

02512-1 of 2

- F. Install service lines so that top of meter will be 4 to 6 inches below finished grade.
- G. Locate water meters one foot inside street right-of-way, one foot on curbside of sidewalk, or as directed by Resident Project Representative.
- H. Crossing of paved surfaces shall be in accordance with Section 02221 – Remove Existing Pavements and structures, and the Drawings.
- I. Turf areas crossed or disturbed under this section shall be repaired in accordance with Section 02920 – Top Soiling & Finished Grading, Sodding, and the Drawings

END OF SECTION

Section 02513

WET CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet connections for new water mains and service lines to existing water mains.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No separate payment will be made for Wet Connections.~~
- ~~2. No compensation will be given for extra work or for damages occurring as a result of an incomplete shutoff.~~
- ~~3. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~
- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. Wet connections consist of using existing valves to isolate sections of pipe to be connected, draining the isolated sections, and completing the connections.
- B. Connection of 2-inch or smaller lines, which may be referred to on Drawings as "2-inch standard connections" or "gooseneck connections" will be measured as 2-inch wet connections. This item is not to be used as part of a 2-inch service line.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe shall conform to requirements of applicable portions of Sections 02501 through 02528 related to piping materials and to water distribution.
- B. Valves shall conform to requirements of Section 02521 - Gate Valves.

PART 3 EXECUTION

3.01 CONNECTION OPERATIONS

- A. Plan wet connections in such manner and at such hours as to least inconvenience public. Notify Resident Project Representative at least 48 hours in advance of making connections.
- B. Do not operate valves on mains in use by Owner. Owner will handle, at no cost to Contractor, operations involving opening and closing valves for wet connections.
- C. Conduct connection operations when Resident Project Representative is at job site. Connection work shall progress without interruption until complete once existing mains have been cut or plugs has been removed for making connections.

END OF SECTION
02513-1 of 1

Section 02514

DISINFECTION OF WATER LINES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of potable water lines.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No separate payment will be made for disinfection of water lines under this Section. Include cost in unit price of water lines.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 651 - Disinfecting Water Mains.
- B. AWWA B 300 – Hypochlorites
- C. NSF Standard 60 – Drinking Water Additives

PART 2 PRODUCTS

2.01 HYPOCHLORITE

- A. Dry hypochlorite: Dry hypochlorite shall be granular type and meet the requirements of AWWA B300 and NSF 60.
- B. Hypochlorite solution: Solution prepared on – site from dry hypochlorite and potable water.

PART 3 EXECUTION

3.01 CONDUCTING DISINFECTION

- A. Water lines constructed shall be promptly disinfected after pressure tests are conducted. An acceptable bacteriologic test shall be obtained before water lines are connected to Owner's water distribution system.
- B. Water for disinfection and flushing shall be purchased from the Owner.
- C. Coordinate chlorination operations through Resident Project Representative.

3.02 PREPARATION

- A. Use required temporary blind flanges, sleeves, plugs, and other items needed to facilitate disinfection of new mains. Normally, each valved section of water line requires two each 3/4-inch taps. A 2-inch

minimum blow-off is required for water lines up to and including 6-inch diameter.

- B. Fire hydrants may be used as blow-offs to flush newly constructed water lines above. Where fire hydrants are not available, locations and designs for blow-offs shall be as indicated on Drawings. Install temporary blow-off valves and remove promptly upon successful completion of disinfection and testing.
- C. Very slowly fill each section of pipe with water in a manner approved by Resident Project Representative. Before beginning disinfection operations, expel air from pipeline.
- D. Install blow-off valves at end of main to facilitate flushing of dead-end water mains. Install permanent blow-off valves according to Drawings.
- E. Excavations shall be backfilled immediately after installation of risers or blow-offs.
- F. Correct problems that may prevent disinfection operations.
- G. Notify and coordinate with Resident Project Representative a minimum of 48 hours before disinfection work is to be performed.
- H. The following procedure may be used:
 - 1. Introduce chlorinating material into water line in accordance with AWWA C 651.
 - 2. If dry hypochlorite is used, it shall be placed in newly laid pipe as construction progresses.
 - 3. Use sufficient quantities of chemicals to produce a concentration of 100 ppm of chlorine. Concentration shall be checked at point of pipeline filling. Concentration check shall be witnessed by Resident Project Representative.
 - 4. Open and close valves in section being disinfected during contact period.
 - 5. After contact period of not less than 24 hours, flush system with clean water until residual chlorine is no greater than 1.0 ppm. Concentration check shall be witnessed by Resident Project Representative.

3.03 BACTERIOLOGICAL TESTING

- A. Microbiological sampling shall be done after disinfecting flush, but prior to connecting the new main into the existing distribution system in accordance with AWWA C651. Two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,000 linear feet of the new water main, plus one set from the end of the line. Samples for bacteriologic analysis shall be collected in sterile bottles. No hose or fire hydrant shall be used in the collection of samples.
- B. If test results indicate need for additional disinfection of water lines based on Texas Department of Health requirements, flush section and begin disinfection procedure again.

3.04 COMPLETION

- A. Upon completion of disinfection and testing, remove risers except those approved for use in subsequent hydrostatic testing, and backfill excavation promptly.

END OF SECTION

Section 02515

HYDROSTATIC TESTING OF PRESSURE PIPELINES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Field hydrostatic testing of newly installed pipelines.
- B. Specifications identify requirements for both small-diameter (less than or equal to 20 inches) pipeline and large-diameter (greater than 20 inches) pipelines. When specifications for large-diameter pipelines differ from those for small-diameter pipelines, paragraphs for large-diameter pipelines will govern for large-diameter pipe.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No payment will be made for hydrostatic testing of pipelines under this Section. Include cost in unit price of pressure pipelines being constructed.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. AWWA C 600 – Installation of Ductile – Iron Water Mains and Their Appurtenances.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 PREPARATION

- A. Hydrostatically test newly installed pressure sewage pipelines before connecting to collection / treatment system.
- B. Hydrostatically test newly installed water pipelines before disinfection, and before connecting to water distribution system.
- C. For large-diameter pipelines, test in lengths between valves, or plugs, of not more than 2500 feet.
- D. Small-diameter pipelines shall be tested in lengths between valves, or plugs, of not more than 1500 feet.
- E. Conduct hydrostatic tests in presence of Resident Project Representative.

3.02 TEST PROCEDURES

- A. Furnish, install, and operate connections, pump, meter and gages necessary for hydrostatic testing.

- B. Allow filled pipeline to sit a minimum of 24 hours before testing begins.
- C. For small-diameter pipelines, expel air and apply a minimum test pressure of 150% of design pressure rating of the pipe measured at the lowest point of the test section.
- D. Begin test by 9:00 a.m. unless otherwise approved by Resident Project Representative. Maintain test pressure within 5 psi for 8 hours. Record initial pressure, initial water meter reading, and starting time. Record pressure at midpoint of test period. Record final pressure, final water meter reading, and ending time. Readings shall be taken in the presence of the Resident Project Representative.
 - 1. If a large quantity of water is required to maintain pressure during test, testing shall be discontinued until cause of water loss is identified and corrected.
 - 2. Failure to maintain test pressure within limit specified shall be cause for test rejection.
- E. Keep valves inside pressure reducing stations closed during hydrostatic pressure test.

3.03 ALLOWABLE LEAKAGE FOR PIPELINES

- A. During hydrostatic tests, no leakage will be allowed for sections of pipelines consisting of welded joints.
- B. Allowable leakage for pipelines with rubber gasket joints: Pipeline installation shall not be accepted if leakage exceeds the amount determined by the following formula:

$$L = \frac{SD P^{0.5}}{133,200}$$

Where: L = The allowable leakage, gallons/hour
S = Length of pipeline tested, feet
D = Nominal diameter of pipe, inches
P = Average test pressure, pounds per square inch, gauge

3.04 CORRECTION FOR FAILED TESTS

- A. Repair joints showing visible leaks on surface regardless of total leakage shown on test. Check valves and fittings to ensure that no leakage occurs that could affect or invalidate test. Remove any cracked or defective pipes, fittings, and valves discovered during pressure test and replace with new items.
- B. Failed water lines shall be disinfected after repair and retesting.
- C. Repeat test until satisfactory results are obtained.

3.05 COMPLETION

- A. Upon satisfactory completion of testing, dispose of test water in a legal and proper manner.
- B. Upon satisfactory completion of testing, remove risers remaining from disinfection and hydrostatic testing, and backfill excavation promptly.

END OF SECTION

SECTION 02516
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, materials, services and equipment as required in conjunction with or properly incidental to placing of concrete as described herein and/or as shown on the drawings.
- B. Includes all cast-in-place concrete for paving, curbs, sidewalks, inlets, culverts and headwalls.

1.2 RELATED DOCUMENTS

- A. Drawing and general provisions of Contract and Division 2 Specification sections, apply to work of this Section.

1.3 CODES AND STANDARDS

- A. The work described in this Section, unless otherwise noted on the Drawings, or herein specified, shall be governed by the latest editions of the following codes or specifications.
 - 1. ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 - 2. ACI 305, "Hot Weather Concreting".
 - 3. ACI 306, "Cold Weather Concreting".
 - 4. ACI 309, "Standard Practice for Consolidation of Concrete".
 - 5. ACI 311, "ACI Manual of Concrete Inspection".
 - 6. ASTM C33, Standard Specification for Concrete Aggregate.
 - 7. ASTM C94, Standard Specification for Ready-Mix Concrete.
 - 8. ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 9. ASTM C150, Standard Specification for Portland Cement.
 - 10. ASTM C260, Standard Specification for Air-Entraining Admixtures.
 - 11. ASTM C494, Standard Specification for Chemical Admixtures for Concrete.
 - 12. ASTM C595, Standard Specification for Blended Hydraulic Cements.

1.4 QUALITY ASSURANCE

- A. Concrete production facilities shall meet the requirements for certification by the National Ready Mixed Concrete Association.
- B. Concrete batchers shall be completely interlocked semi-automatic or automatic batchers, as defined by the Concrete Plant Manufacturers Bureau.
- C. Concrete batchers shall have graphic, digital, or photographic recorders, which shall register both empty balance and total weight (or volume of water or admixture) of each batched material, time to the nearest minute, date, identification of batch, and numerical count of each batch. Copies of the record shall be furnished to the Testing Laboratory.

1.5 CONCRETE MIX DESIGN

- A. Design concrete mixes in accordance with ACI 318.
- B. Submit proposed mix designs, including confirmation cylinder test results, in accordance with ACI 318 to the Engineer for evaluation a minimum of 14 days prior to placing concrete. Show:
 - 1. Proportions of cement, fine and coarse aggregates, and water.
 - 2. Combined aggregate gradation.
 - 3. Aggregate specific gravities and gradations.
 - 4. Water-cement ratio, design strength, slump and air content.
 - 5. Type of cement and aggregates.
 - 6. Type and dosage of admixtures.
 - 7. Type, color and dosage of integral coloring compounds, where applicable.
 - 8. Special requirements for pumping.
 - 9. Range of ambient temperature and humidity for which design is valid.
 - 10. Any special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product.

The use of fly ash is not permitted.

- C. Mix designs based on record of past performance in accordance with ACI 301 Method 2, may be submitted in lieu of mix designs required above, provided all necessary information is included.
- D. Check mix designs and revise if necessary wherever changes are made in aggregates or in surface water content of aggregate or workability of concrete. Slump shall be minimum to produce workable mix. Laboratory shall prescribe maximum quantity of water.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready-mixed in accordance with ASTM C94. Mix concrete a minimum of 70 revolutions of transit mix drum at mixing speed. A minimum of 40 revolutions shall be at the production plant.
- B. Schedule delivery so that continuity of any pour will not be interrupted for over 15 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.

1.7 JOB CONDITIONS

- A. Hot Weather Requirements:
 - 1. Follow ACI 301 and ACI 305.
 - 2. Provide retarding type admixture conforming to ASTM C494, Type A or D in accordance with manufacturer's recommendations.
 - 3. Maximum concrete temperature shall not exceed 95°F.
 - a. Maximum concrete temperature for concrete with a specified strength greater than 6000 psi shall not exceed 90°F.
- B. Cold Weather Concreting:

1. Follow ACI 301 and ACI 306.
 2. When ambient temperature at site is below 40°F, or is expected to fall to that temperature within ensuing 24 hours, heat water and/or aggregate prior to adding to mix so that temperature of concrete will be between 60°F and 90°F at time of placement.
 3. Maintain temperature of deposited concrete above 32°F and for a minimum of seven days after placing.
- C. Temperature Changes: Maintain changes in concrete temperature as uniformly as possible, but in no case exceed change of 5°F per hour or 25°F in any 24 hour period.
- D. Combustion heaters shall not be used during the first 48 hours without precautions to prevent exposure of concrete and workmen to exhaust gases containing carbon dioxide and/or carbon monoxide.
- E. Admixtures intended to accelerate hardening of concrete or produce higher than normal strength at early periods will not be permitted unless specified. The use of calcium chloride is specifically prohibited.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement:
1. Portland Cement, Type I or III, conforming to the requirements of ASTM C150.
 2. Blended Hydraulic Cements, Type 1P, conforming to the requirements of ASTM C595.
- B. Aggregate:
1. Fine: ASTM C33; clean, hard, durable, uncoated, natural sand, free from silt, loam or clay.
 2. Coarse: ASTM C33; hard, durable, uncoated, crushed stone, gradation in accordance with Size No. 467 for piers and footings and Size No. 67 for all other concrete. Maximum aggregate size shall be in accordance with ACI 318.
 3. Grading shall be in accordance with "Standard Method for Sieve Analysis of Fine and Coarse Aggregates" (ASTM C136).
- C. Water: ASTM C94, Paragraph 4.1.3; potable, clean and free from oil, acid and injurious amounts of vegetable matter, alkalies, and other impurities.
- D. Admixtures:
1. Cement-dispersing, water-reducing types that follow water-cement ratio law. Admixtures shall conform to ASTM C494, Type A or D, and shall be used strictly in accordance with manufacturer's recommendations and as determined by the Testing Laboratory. Admixture shall not discolor concrete or in any way affect the appearance of the concrete.

- a. High-range water reducing admixture conforming to ASTM C494, Type F, may be used as required and shall be one of the following types or equal:
 1. Gifford-Hill PSI Super
 2. Master Builders Admixture LA-35
 3. SIKA Sikament
 4. W.R. Grace WRDA-19
 2. An air-entraining admixture conforming to ASTM C260 shall be used and shall be one of the following types or equal:
 - a. Gifford-Hill Air-Tite
 - b. Master Builders MB-VR
 - c. SIKA AER
 - d. W.R. Grace Darex AEA
 3. Use of calcium chloride is specifically prohibited.
- E. Non-Shrink Cement Grout:
1. Qualities: Premixed non-shrink grout requiring only addition of water. Non-metallic type grout where grout will be sight exposed.
 - a. Minimum compressive strength of 5000 psi at 7 days and 7500 psi at 28 days when placed at a plastic consistency of 115% flow factor.
 - b. Free of chlorides, sulphates or gas producing agents.
 2. Standards:
 - a. Overall product: CRD - C-621.
 - b. Compressive Strength: ASTM C109, 2 inch cubes.
 - c. Bleed Performance: CRD - C-611.
 - d. Flow Factor: ASTM C230.

2.2 CONCRETE MIXES

- A. Strength: Concrete is classified and specified by ultimate compressive strength (f'_c) at the age of 28 days.
- B. Design concrete to yield strengths indicated on the Drawings.
- C. Concrete permanently exposed to weather shall contain an air-entraining admixture to produce a range of 4.5% to 7.5% air by volume of concrete.
- D. Proportions: Proportions of cement, aggregate, and water to attain required plasticity and compressive strength shall be in accordance with ACI 318.

PART 3 - EXECUTION

3.1 GENERAL

- A. Inserts: Give the various trades and subcontractors ample notification and opportunity to furnish any and all anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frame vents, wires, supports, or other items required to be built into the concrete by the provisions of the drawings or of the specification governing the work of such trades and subcontractors, or as it may be necessary for the proper execution of their work. Obtain suitable templates or instructions for the installations of such items which are required to be placed in the forms.
- B. Slump: Concrete shall not be placed when its plasticity, as measured by slump tests, is outside the following limits: 5 inches maximum, 2 inches minimum.
- C. Classes of Concrete and Usage: Concrete of the several classes of concrete required shall have the characteristics shown on the Drawings.
- D. Mixing: Transit-mixed concrete conforming to the requirements of ASTM C94 shall be used in lieu of concrete mixed at the job site. Concrete shall not be transported or used in any case after a period in excess of ninety (90) minutes has elapsed after the introduction of water into the mixer. The agency supplying transit-mixed concrete shall have a plant of sufficient capacity and adequate transportation facilities, to assure continuous delivery at the rate required. The frequency of deliveries to the site of the work must be such as to provide for placing the concrete continuously throughout any one (1) pour.
- E. Conveying Concrete: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of the ingredients. Concrete to be conveyed by pumping shall be submitted to the Testing Laboratory for evaluation for each class of concrete specified before being used. Test cylinders for pumped concrete shall be taken at the discharge end of the pumping equipment.
- F. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to assure a practically continuous flow of concrete at the delivery end without separation of the materials. The use of gravity-flow or aluminum chutes or conveyors for transporting concrete horizontally will not be permitted.

3.2 FIELD CONCRETE CONTROL AND TESTING

- A. Secure composite samples in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.
- B. All concrete with required strength of 6000 psi or less shall be tested as follows:
 - 1. Mold and cure five (5) specimens from each sample in accordance with ASTM C31.
 - 2. Two (2) specimens shall be tested at seven days for information, two shall be tested at 28 days for acceptance, and the remaining cylinder shall be tested as directed.
- C. Any deviations from the requirements of ASTM Specifications shall be recorded in the test report. Test concrete specimens in accordance with ASTM C39.
- D. Make at least one strength test (five specimens) for each 100 cu. yd. or fraction thereof, of

each mix design of concrete placed in any one day. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, in accordance with ASTM C143.

- E. Determine air content of air-entrained, normal weight and/or lightweight, concrete sample for each strength test, in accordance with either ASTM C231, ASTM C173, or ASTM C138. Determine temperature of concrete sample for each strength test.
- F. Inspect each batch of concrete, adjust amounts of mixing water to assure uniform consistency from truck to truck. Check mixing from mixers before mix begins to set and within time limits set forth in ASTM C94.
 - 1. Control addition of water to concrete at job site and length of time concrete is allowed to remain in truck during placement.
 - 2. Certify each delivery ticket indicating class of concrete delivered, amount of water added and time at which cement and aggregate was discharged into truck, and time at which concrete was discharged from truck.
- G. Should the strength of concrete fall below the minimum, then additional tests, including load tests, may be required. These tests, if required, shall be made at the contractor's expense and shall be in accordance with ASTM C42 and ACI 318. If tests do not meet the applicable requirements, then the structure, or any part of the structure, shall be removed and replaced at the contractor's expense. The specified strength must be met at 28 days. If not, the concrete is considered not acceptable and must be removed and replaced. The .85 factor in ACI 318 will not be allowed.
- H. Test reports shall show concrete mix identification number or give proportions of ingredients, time test was made, truck ticket, number, slump and time of batching, and location of each placement.
- I. Report promptly to Engineer all details of reasons for rejection of any and all quantities of concrete. Give all information concerning locations of the concrete pours, quantities, date of pours, and other pertinent facts concerning concrete represented by the specimens.
- J. Grout: For every one third (1/3) cubic yards of grout placed, grout strength shall be tested with a set of cubes as follows:
 - 1. A set of cubes shall consist of three cubes to be tested at 7 days, and three cubes to be tested at 28 days.
 - 2. Test cubes shall be made and tested in accordance with ASTM C109, with the exception that the grout should be restrained from expansion by a top plate.

3.3 PLACING CONCRETE

- A. Place concrete in reasonably uniform layers, approximately horizontal, and not more than eighteen inches (18") deep, exercising care to avoid vertical joints or inclined planes. The piling up of concrete in the forms in such a manner as to cause the separation or loss of any of its ingredients will not be permitted. Concrete which has partially set or hardened shall not, under any circumstances, be deposited in the work.
- B. Place concrete in the forms as nearly in its final position as is practical to avoid rehandling. Exercise special care to prevent splashing the forms or reinforcement with concrete.

Remove any hardened or partially hardened concrete which has accumulated on the forms or reinforcement before the work proceeds. Do not place concrete on previously deposited concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the respective member or section, except as hereinafter specified.

- C. Do not permit concrete to drop freely any distance greater than five feet (5'). Where longer drops are necessary, use a chute, tremie, or other acceptable conveyance to assist the concrete into place without separation. Do not pour directly into any excavations where water is standing.
- D. Vibration: As soon as concrete is deposited, thoroughly agitate same by means of mechanical vibrators and suitable hand tools, so manipulated as to work the mixture well into all parts and corners of the forms, and entirely around the reinforcement and inserts. Mechanical vibrators shall maintain frequencies in accordance with the recommendations of ACI 309, Table 5.1.4 and shall be operated by competent workmen. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. A spare vibrator shall be kept on the job site during all concrete placing operations.
- E. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, the surface of the latter shall be thoroughly roughened and cleaned of all foreign matter, scum and laitance.
- F. Construction Joints: Except as otherwise specifically indicated on the drawings, each concrete member shall be considered as a single unit of operations, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, same shall be located at or near the midpoints of spans. Additional construction joints shall not be made under any circumstances without prior review by the engineer.
- G. Protect all freshly placed concrete from washing by rain, flowing water, etc. Do not allow the concrete to dry out from the time it is deposited in the forms until the expiration of the curing period.
- H. Grout shall be mixed only in such quantities as are needed for immediate use. No retempering shall be permitted and materials which have been mixed for a period exceeding thirty (30) minutes shall in no case be used upon any portion of the work.
- I. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the contractor's expense and shall be in conformity with all of the requirements of the contract documents. Removal and replacement of concrete work shall be done in such a manner as not to impair the appearance or strength of the structure in any way.
- J. Cleaning: Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the premises. Finished concrete surfaces shall be left in a clean and perfect condition, satisfactory to the owner. Sweep with an ordinary broom and remove all mortar, concrete droppings, loose dirt, mud, etc.

END OF SECTION

02516-7 of 7

Section 02521

GATE VALVES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gate valves.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment is on a per each basis for each size valve installed under this Section, except those used in the installation of fire hydrants.~~
- ~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM A 307 - Carbon Steel Externally Threaded Standard Fasteners.
- B. ASTM B 62 - Composition Bronze or Ounce Metal Casting.
- C. ASTM D 429 - Test Methods for Rubber Property-Adhesion to Rigid Substrates.
- D. ASTM B 763 - Copper Alloy Sand Casting for Valve Application.
- E. AWWA C 500 – Metal Seated Gate Valves for Water Supply Service.
- F. AWWA C 509 - Resilient-seated Gate Valves for Water Supply Service.
- G. AWWA C 550 - Protective Epoxy Interior Coatings for Valves and Hydrants.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit manufacturer's product data for proposed valves for approval.

1.05 QUALITY CONTROL

- A. Submit manufacturer's affidavit that gate valves are manufactured in the United States and conform to stated requirements of AWWA C 500, AWWA C 509, and this Section, and that they have been satisfactorily tested in accordance with AWWA C 500 and AWWA C 509 as appropriate.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Gate Valves: AWWA C 500, AWWA C 509, additional requirements of this Section and as shown on the Drawings. Direct bury valves and those in subsurface vaults open counter clockwise.

- B. If type of valve is not indicated on Drawings, use gate valves as line valves for sizes less than 16-inches. If type of valve is indicated, no substitute is allowed.
- C. Coatings for Valves: Interior and exterior surfaces shall be protected with a fusion bonded epoxy coating complying with AWWA C550. Coating shall be 10 mil dry film thickness.
- D. Gate Valves 1-1/2 Inches in Diameter and Smaller: 125 psig; bronze; rising-stem; single-wedge; disc type; screwed ends.
- E. Gate Valves 2 Inches to 12 Inches in Diameter: Bi-directional, resilient seated (AWWA C 509) 200 psig, bronze mounting, mechanical joint ends with rubber joint rings, and nut-operated unless otherwise specified or shown on the Drawings. Comply with details in the Drawings and the following requirements:
1. Design: Fully encapsulated rubber wedge or rubber seat ring mechanically attached with minimum 304 stainless-steel fasteners or screws; threaded connection isolated from water by compressed rubber around opening.
 2. Body: Ductile iron, flange bonnet and stuffing box together with ASTM A 307 Grade B bolts. Manufacturer's initials, pressure rating, and year manufactured shall be cast in body.
 3. Bronze: Valve components in waterway to contain not more than 15 percent zinc and not more than 2 percent aluminum.
 4. Stems: ASTM B 763 bronze, alloy number 995 minimum yield strength of 40,000 psi; minimum elongation in 2-inches of 12 percent, non-rising.
 5. O-rings: AWWA C 509, sections 2.2.6 and 4.8.2.
 6. Stem Seals: Consist of three O-rings, two above and one below thrust collar with anti-friction washer located above thrust collar.
 7. Stem Nut: Independent or integrally cast of ASTM B 62 bronze.
 8. Resilient Wedge: Molded, synthetic rubber, vulcanized and bonded to iron wedge or attached with 304 stainless steel screws tested to meet or exceed ASTM D 429 Method B; seat against epoxy-coated surface in valve body.
 9. Bolts: AWWA C 509 Section 4.4; stainless steel.
- F. Gate Valves 14 Inches to 24 Inches in Diameter: AWWA C 500; mechanical joint ends with rubber rings and nut-operated unless otherwise specified or shown on the Drawings, double disc, 150 psi, and comply with the details in the Drawings and the following:
1. Body: Ductile iron; flange together bonnet and stuffing box with ASTM A 307 Grade B bolts. Manufacturer's initials, pressure rating, and year manufactured shall be cast in body. Equip with rollers, tracks, and scrapers.
 2. Stems: Machined from ASTM B 62 bronze rod with integral forged thrust collar machined to size; non-rising.
 3. Stem Seals: Consist of one O-ring above and one O-ring below thrust collar with anti-friction washer located above thrust collar for operating torque.
 4. Stem Nut: Independent or integrally cast of ASTM B 62 bronze.
 5. Discs: Cast iron with bronze disc rings securely peened into machined dovetailed grooves.

6. Wedging Device: Solid bronze or cast-iron, bronze-mounted wedges. Thin plates or shapes integrally cast into cast-iron surfaces are acceptable. Other moving surfaces integral to wedging action shall be bronze monel or nickel alloy-to-iron.
 7. Bronze Mounting: Built as integral unit mounted over, or supported on, cast-iron base and of sufficient dimensions to be structurally sound and adequate for imposed forces.
 8. Gear Cases: Cast iron; furnished on 18-inch and larger valves and of extended type with steel side plates, lubricated, gear case enclosed with oil seal or O-rings at shaft openings.
 9. Stuffing Boxes: Located on top of bonnet and outside gear case.
- G. Gate Valves 14 Inches and Larger: Furnish and equip with bypass valves.
1. Sizes: Provide 3-inch bypass valves for 14-inch through 20-inch gate valves. Provide 4-inch bypass valves for 24-inch gate valves.
- H. Gate Valves Installed at Greater than 4-foot Depth: Provide non-rising, extension stem having coupling sufficient to attach securely to operating nut of valve. Upper end of extension stem shall terminate in square wrench nut no deeper than 4 feet from finished grade.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Earthwork. Conform to applicable provisions of Section 02317 - Excavation and Backfilling for Utilities.

3.02 SETTING VALVES AND VALVE BOXES

- A. Remove foreign matter from within valves prior to installation. Inspect valves in open and closed positions to verify that parts are in satisfactory working condition.
- B. Poly-wrap valves with Polyethylene Wrap.
- C. Install valves and valve boxes where shown on Drawings. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of 4 feet, or to undisturbed trench face if less than 4 feet. Install valves completely closed when placed in water line.
- D. For pipe section of each valve box, use only cast iron, ductile iron, or DR18 PVC pipe cut to proper length. Size to allow future operation of valve. Assemble and brace box in vertical position as indicated on Drawings.

3.03 DISINFECTION AND TESTING

- A. Disinfect valves and appurtenances as required by Section 02514 - Disinfection of Waterlines and test as required by Section 02515 - Hydrostatic Testing of Pipelines.

END OF SECTION

Section 02528

POLYETHYLENE WRAP

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Polyethylene wrap to be used in open-cut construction for ductile iron pipe when cathodic protection system is not required by Drawings.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No separate payment will be made for polyethylene wrap. Include cost of polyethylene wrap in unit price for pipes and fittings to be wrapped.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCE

- A. ASTM D 1248 - Polyethylene Plastics Molding and Extrusion Materials.
- B. AWWA C 105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.

1.03 SUBMITTALS

- A. Submit product data in accordance with Section 01330 - Submittal Procedures.
- B. Submit product data for proposed film and tape for approval.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Polyethylene Film: Tubular or sheet form without tears, breaks, holidays, or defects; conforming with requirements of AWWA C 105, 2.5 to 3 percent carbon black content, either low- or high-density:
 - 1. Low-density polyethylene film. Low-density polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of ASTM D 1248.
 - a. Raw material.
 - (1) Type : I
 - (2) Class: C (black)
 - (3) Grade: E-5
 - (4) Flow rate (formerly melt index): 0.4 g/10 minute, maximum

- (5) Dielectric strength: Volume resistivity, 10^{15} ohm-cm, minimum
 - b. Physical properties.
 - (1) Tensile strength: 1200 psi, minimum
 - (2) Elongation: 300 percent, minimum
 - (3) Dielectric strength: 800 V/mil thickness, minimum
 - c. Thickness: Low-density polyethylene film shall have a nominal thickness of 0.008 inch. The minus tolerance on thickness is 10 percent of the nominal thickness.
2. High-density, cross-laminated polyethylene film. High-density, cross laminated polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of ASTM D 1248
- a. Raw material.
 - (1) Type: III
 - (2) Class: C (black)
 - (3) Grade: P33
 - (4) Flow rate (formerly melt index): 0.4 to 0.5g/10 minute, maximum
 - (5) Dielectric strength: Volume resistivity, 10^{15} ohm-cm, minimum
 - b. Physical properties.
 - (1) Tensile strength: 5000 psi, minimum
 - (2) Elongation: 100 percent, minimum
 - (3) Dielectric strength: 800 V/mil thickness, minimum
 - c. Thickness: Film shall have a nominal thickness of 0.004 inch. The minus tolerance of thickness is 10 percent of the nominal thickness.
- B. Polyethylene Tape: Provide 3-inch-wide, plastic-backed, adhesive tape; Paleocene No. 900, Scotchwrap No. 50, or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Remove lumps of clay, mud, and cinders from pipe surface prior to installation of polyethylene encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.
- B. Fit polyethylene film to contour of pipe to effect a snug, but not tight fit; encase with minimum space between polyethylene and pipe. Allow sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to

prevent damage to polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.

- C. For installations below water table or in areas subject to tidal actions, seal both ends of polyethylene tube with adhesive tape at joint overlap.

3.02 INSTALLATION

A. Tubular Type (Method A):

1. Cut polyethylene tube to a length approximately 2 feet longer than pipe section. Slip tube around pipe, centering tube to provide 1-foot overlap on each adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears pipe ends.
2. Lower pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene tube.
3. After assembling pipe joint, make overlap of polyethylene tube. Pull bunched polyethylene from preceding length of pipe, slip it over end of adjoining length of pipe, and secure in place. Then slip end of polyethylene from adjoining pipe section over end of first wrap until it overlaps joint at end of preceding length of pipe. Secure overlap in place. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points.
4. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

B. Tubular Type (Method B):

1. Cut polyethylene tube to a length approximately 1 foot shorter than pipe section. Slip tube around pipe, centering it to provide 6 inches of bare pipe at each end. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points; secure ends.
2. Before making up joint, slip 3-foot length of polyethylene tube over end of preceding pipe section, bunching in accordion-fashion lengthwise. After completing joint, pull 3-foot length of polyethylene over joint, overlapping polyethylene previously placed on each adjacent section of pipe by at least 1 foot; make each end snug and secure.
3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

C. Sheet Type:

1. Cut polyethylene sheet to a length approximately 2 feet longer than pipe section. Center length to provide 1-foot overlap on each adjacent pipe section, bunching sheet until it clears pipe ends. Wrap polyethylene around pipe so that sheet circumferentially overlaps top quadrant of pipe. Secure cut edge of polyethylene sheet at intervals of approximately 3 feet.
2. Lower wrapped pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene. After completing joint, make overlap and secure ends.
3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner.

- D. Pipe-shaped Appurtenances: Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in same manner as pipe.
- E. Odd-shaped Appurtenances: When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in tube, wrap with flat sheet or split length of polyethylene tube by passing sheet around appurtenance and encasing it. Make seams by bringing edges together, folding over twice, and taping down. Tape polyethylene securely in place at valve stem and other penetrations.
- F. Openings in Encasement: Create openings for branches, service taps, blowoffs, air valves, and similar appurtenances by making an X-shaped cut in polyethylene and temporarily folding back film. After appurtenance is installed, tape slack securely to appurtenance and repair cut, as well as other damaged area in polyethylene, with tape. Service taps may also be made directly through polyethylene, with any resulting damaged areas being repaired as specified.
- G. Junctions between Wrapped and Unwrapped Pipe: Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, extend polyethylene wrap to cover adjacent pipe for distance of at least 3 feet. Secure end with circumferential turns of tape. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for minimum clear distance of 3 feet away from ductile iron pipe.

3.03 REPAIRS

- A. Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrapped around pipe to cover damaged area, and secured in place.

END OF SECTION

SECTION 02531

GRAVITY SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gravity sanitary sewers and appurtenances, including stacks and service connections.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment for gravity sanitary sewers by open-cut is on linear foot basis, complete in place, including sewer pipe, connections to existing manholes, post inspection and testing. Measurement will be taken along centerline of pipe from centerline to centerline of manholes.~~
- ~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit proposed methods, equipment, materials and sequence of operations for sewer construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.

1.04 QUALITY ASSURANCE

- A. Qualifications. Install sanitary sewer that is watertight both in pipe-to-pipe joints and in pipe to-manhole connections. Perform testing in accordance with Section 02533 - Testing for Sanitary Sewers.

B. Regulatory Requirements.

1. Install sewer lines to meet minimum separation distance from potable water line, as scheduled below. Separation distance is defined as distance between outside of water pipe and outside of sewer pipe. When possible, install new sanitary sewers no closer to water lines than 9 feet in all directions. Where this separation distance cannot be achieved, new sanitary sewers shall be installed as specified in this section.
2. Make notification to Engineer when water lines are uncovered during sanitary sewer installation where minimum separation distance cannot be maintained.
3. Lay gravity sewer lines in straight alignment and grade.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Inspect pipe and fittings upon arrival of materials at job site.
- B. Handle and store pipe materials and fittings to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe and fittings along ground. Do not roll pipe unrestrained from delivery trucks.

- C. Use mechanical means to move or handle pipe. Employ acceptable clamps, rope or slings around outside barrel of pipe and fittings. Do not use hooks, bars, or other devices in contact with interior surface of pipe to lift or move lined pipe.

PART 2 PRODUCTS

2.01 PIPE

- A. Provide piping materials for gravity sanitary sewers of sizes and types indicated on Drawings or as specified.
- B. Unlined reinforced concrete pipe is not acceptable.

2.02 PIPE MATERIAL SCHEDULE

- A. Unless otherwise shown on Drawings, use pipe materials that conform to requirements specified in one or more of following Sections:
 - 1. Section 02501 - Ductile Iron Pipe and Fittings.
 - 2. Section 02506 - Polyvinyl Chloride Pipe.
- B. Where shown on Drawings, provide pipe meeting minimum class, dimension ratio, or other criteria indicated.
- C. Pipe materials other than those listed above shall not be used for gravity sanitary sewers.

2.03 APPURTENANCES

- A. Stacks. Conform to requirements of Section 02534 - Sanitary Sewer Service.
- B. Service Connections. Conform to requirements of Section 02534 - Sanitary Sewer Service.
- C. Roof, street or other type of surface water drains shall not be connected or reconnected into sanitary sewer lines.

2.04 BEDDING, BACKFILL, AND TOPSOIL MATERIAL

- A. Bedding and Backfill: Conform to requirements of Section 02317 - Excavation and Backfill for Utilities, Section 02320 - Utility Backfill Materials.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation when construction will affect traffic.
- B. Provide barricades, flashing warning lights, and warning signs for excavations. Maintain barricades and warning lights where work is in progress or where traffic is affected by work.
- C. Perform work in accordance with OSHA standards. Employ trench safety system as specified by OSHA for excavations over 5 feet deep.
- D. Immediately notify agency or company owning utility line which is damaged, broken or disturbed. Obtain approval from Engineer and agency or utility company for repairs or relocations, either

temporary or permanent.

- E. Remove old pavements and structures including sidewalks and driveways.
- F. Install and operate dewatering and surface water control measures if needed.
- G. Do not allow sand, debris or runoff to enter sewer system.

3.02 DIVERSION PUMPING

- A. Install and operate required bulkheads, plugs, piping, and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow. Obtain approval for diversion pumping equipment and procedures from Engineer.
- B. Design piping, joints and accessories to withstand twice maximum system pressure or 50 psi, whichever is greater.
- C. No sewage shall be diverted into area outside of sanitary sewer.
- D. In event of accidental spill or overflow, immediately stop overflow and take action to clean up and disinfect spillage. Promptly notify Engineer so that required reporting can be made to TCEQ Agency by Engineer.

3.03 EXCAVATION

- A. Earthwork. Conform to requirements of Section 02317 - Excavation and Backfill for Utilities. Use bedding as indicated on Drawings.
- B. Line and Grade. Establish required uniform line and grade in trench from benchmarks identified by Engineer. Maintain this control for minimum of 100 feet behind and ahead of pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of work. Use of appropriately sized grade boards which are substantially supported is also acceptable. Protect boards and location stakes from damage or dislocation.
- C. Trench Excavation. Excavate pipe trenches to depths shown on Drawings and as specified in Section 02317 - Excavation and Backfill for Utilities.

3.04 PIPE INSTALLATION BY OPEN CUT

- A. Install pipe in accordance with pipe manufacturer's recommendations and as specified in following paragraphs.
- B. Install pipe only after excavation is completed, bottom of trench fine graded, bedding material is installed, and trench has been approved by Engineer.
- C. Install pipe to line and grade indicated. Place pipe so that it has continuous bearing of barrel on bedding material and is laid in trench so interior surfaces of pipe follow grades and alignment indicated. Provide bell holes where necessary.
- D. Install pipe with spigot ends toward downstream end of flow such that water flows into bell and out the spigot.
- E. Form concentric joint with each section of adjoining pipe so as to prevent offsets.
- F. Keep interior of pipe clean as installation progresses. Remove foreign material and debris from

pipe

- G. Provide lubricant, place and drive home newly laid sections with come-a-long winches so as to eliminate damage to sections. Install pipe to "home" mark where provided. Use of back hoes or similar powered equipment will not be allowed unless protective measures are provided and approved in advance by Engineer.
- H. Keep excavations free of water during construction and until final inspection.
- I. When work is not in progress, cover exposed ends of pipes with approved plug to prevent foreign material from entering pipe.
- J. Water line/new sewer line separation. When new sanitary sewers are installed, they shall be installed no closer to waterlines than nine feet in all directions. Sewers that parallel waterlines must be installed in separate trenches. Where the nine foot separation distance cannot be achieved, the following guidelines will apply:
1. Where a sanitary sewer parallels a waterline, the sewer shall be constructed of cast iron, ductile iron or PVC meeting ASTM specifications with a pressure rating for both the pipe and joints of 150 psi. The vertical separation shall be a minimum of two feet between outside diameters and the horizontal separation shall be a minimum of four feet between outside diameters. The sewer shall be located below the waterline.
 2. Where a sanitary sewer crosses a waterline and the sewer is constructed of cast iron, ductile iron or PVC with a minimum pressure rating of 150 psi, an absolute minimum distance of 6 inches between outside diameters shall be maintained. In addition the sewer shall be located below the waterline where possible and one length of the sewer pipe must be centered on the waterline.
 3. Where a sewer crosses under a waterline and the sewer is constructed of ABS truss pipe, similar semi-rigid plastic composite pipe, clay pipe or concrete pipe with gasketed joints, a minimum two foot separation distance shall be maintained. The initial backfill shall be cement stabilized sand (two or more bags of cement per cubic yard of sand) for all sections of sewer within nine feet of the waterline. This initial backfill shall be from one quarter diameter below the centerline of the pipe to one pipe diameter (but not less than 12 inches) above the top of the pipe.
 4. Where a sewer crosses over a waterline all portions of the sewer within nine feet of the waterline shall be constructed of cast iron, ductile iron, or PVC pipe with a pressure rating of at least 150 psi using appropriate adapters. In lieu of this procedure the new conveyance may be encased in a joint of 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at 5 feet intervals with spacers or be filled to the springline with washed sand. The encasement pipe should be centered on the crossing and both ends sealed with cement grout or manufactured seal.
- K. Water line/manhole separation. Unless sanitary sewer manholes and the connecting sewer can be made watertight and tested for no leakage, they must be installed so as to provide a minimum of nine feet of horizontal clearance from an existing or proposed waterline. Where the nine foot

separation distance cannot be achieved, a carrier pipe as described in subsection (a)(4) of this section may be used where appropriate.

- L. Where the length of the stub is not indicated, install the stub to the right-of-way line and seal the free end with an approved plug.

3.05 PIPE INSTALLATION OTHER THAN OPEN CUT

- A. For installation of pipe by augering, jacking, or tunneling, conform to requirements of specification sections on tunneling augering, jacking and microtunneling work as appropriate.

3.06 INSTALLATION OF APPURTENANCES

- A. Service Connections. Install service connections to conform to requirements of Section 2534 - Sanitary Sewer Service.
- B. Stacks. Construct stacks to conform to requirements of 02534 - Sanitary Sewer Service.
- C. Construct manholes to conform to requirements of Section 02083 – Fiberglass Manholes, as applicable. Install frames, rings, and covers to conform to requirements of Section 02084 - Frames, Grates, Rings, and Covers.

3.07 INSPECTION AND TESTING

- A. Visual Inspection: Check pipe alignment in accordance with Section 02533 - Testing for Sanitary Sewers.
- B. Mandrel Testing. Use Mandrel Test to test flexible pipe for deflection. Refer to Section 02533 - Testing for Sanitary Sewers.
- C. Pipe Leakage Test. After backfilling line segment and prior to tie-in of service connections, visually inspect gravity sanitary sewers where feasible, and test for leakage in accordance with Section 02533 - Testing for Sanitary Sewers. Maintain piezometer installed to control ground water and surface water until acceptance testing is completed.

3.08 BACKFILL AND SITE CLEANUP

- A. Backfill and compact soil in accordance with Section 02317 - Excavation and Backfill for Utilities.
- B. Backfill trench in specified lifts only after pipe installation is approved by Engineer.
- C. Repair and replace removed or damaged pavement, curbs, gutters, and sidewalks.
- D. Provide hydromulch seeding in areas of commercial, industrial or undeveloped land use over surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on Drawings. Provide minimum of 4 inches of topsoil.
- E. Provide sodding in areas of residential land use over surface of ground disturbed during construction and not paved or not designated to be paved. Grade surface at uniform slope to natural grade as indicated on Drawings. Provide minimum of 4 inches of topsoil.

END OF SECTION
02531-5 of 5

SECTION 02533

TESTING FOR SANITARY SEWERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. TESTING of sanitary sewers including:

1. Visual inspection of sewer pipes
2. Mandrel testing for flexible sewer pipes.
3. Leakage testing of sewer pipes.
4. Leakage testing of manholes.
5. Smoke testing of point repairs.

B. All tests listed in this Section are not necessarily required on this Project. Required tests are named in other Sections which refer to this Section for testing criteria and procedures.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No payment will be made for TESTING under this Section. Include payment in unit price for work requiring TESTING.~~
- ~~2. Refer to Section 01270 Measurement and Payment for unit price procedures.~~

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 REFERENCES

- A. ASTM D 3034 - Standard Specification for Type PSM Polyethylene (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- B. ASTM F 1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air.

1.04 PERFORMANCE REQUIREMENTS

- A. Gravity flow sanitary sewers are required to have straight alignment and uniform grade between manholes.
- B. Flexible pipe, including "semi-rigid" pipe, is required to show no more than 5 percent deflection. Test pipe no sooner than 30 days after backfilling of line segment but prior to final acceptance using standard mandrel to verify that installed pipe is within specified deflection tolerances.
- C. Perform air testing in accordance with requirements of this Section and TCEQ requirements. Refer to Table 02533-2, Time Allowed for Pressure Loss from 3.5 psig to 2.5 psig, Table 02533-3, Minimum Testing Times for Low Pressure Air Test, and Table 02533-4, Vacuum Test Time Table,

at end of this Section.

1.05 SUBMITTALS

- A. Conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Test Plan: Before testing begins and in adequate time to obtain approval through submittal process, prepare and submit test plan for approval by Engineer. Include testing procedures, methods, equipment, and tentative schedule. Obtain advance written approval for deviations from Drawings and Specifications.
- C. Test Reports: Submit test reports for each test on each segment of sanitary sewer.

1.06 GRAVITY SANITARY SEWER QUALITY ASSURANCE

- A. Repair, correct, and retest manholes or sections of pipe which fail to meet specified requirements when tested.

1.07 SEQUENCING AND SCHEDULING

- A. Perform testing as work progresses. Schedule testing so that no more than 1000 linear feet of installed sewer remains untested at one time.
- B. Coordinate testing schedules with Engineer. Perform testing under observation of Engineer or Engineer's Representative.

PART 2 PRODUCTS

2.01 DEFLECTION MANDREL

- A. Mandrel Sizing. Rigid mandrel shall have outside diameter (O.D.) equal to 95 percent of inside diameter (I.D.) of pipe. Inside diameter of pipe, for purpose of determining outside diameter of mandrel, shall be average outside diameter minus two minimum wall thicknesses for O.D. controlled pipe and average inside diameter for I.D. controlled pipe, dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
- B. Mandrel Design. Rigid mandrel shall be constructed of metal or rigid plastic material that can withstand 200 psi without being deformed. Mandrel shall have nine or more "runners" or "legs" as long as total number of legs is odd number. Barrel section of mandrel shall have length of at least 75 percent of inside diameter of pipe. Rigid mandrel shall not have adjustable or collapsible legs which would allow reduction in mandrel diameter during testing. Provide and use proving ring for modifying each size mandrel.
- C. Proving Ring. Furnish "proving ring" with each mandrel. Fabricate ring of 1/2-inch-thick, 3-inch-wide bar steel to diameter 0.02 inches larger than approved mandrel diameter.
- D. Mandrel Dimensions (5 percent allowance). Average inside diameter and minimum mandrel diameter are specified in Table 02533-5, Pipe vs. Mandrel Diameter, at end of this Section. Mandrels for higher strength, thicker wall pipe or other pipe not listed in table may be used when approved by Engineer.

2.02 LOW PRESSURE AIR TEST

02533-2 of 8

- A. Minimum Requirement for Equipment:
 - 1. Control panel
 - 2. Low-pressure air supply connected to control panel.
 - 3. Pneumatic plugs: Acceptable size for diameter of pipe to be tested; capable of with standing internal test pressure without leaking or requiring external bracing.
 - 4. Air hoses from control panel to:
 - a. Air supply.
 - b. Pneumatic plugs.
 - c. Sealed line for pressuring.
 - d. Sealed line for monitoring internal pressure.
- B. Testing Pneumatic Plugs: Place pneumatic plug in each end of length of pipe on ground. Pressurize plugs to 25 psig; then pressurize sealed pipe to 5 psig. Plugs are acceptable when they remain in place against test pressure without external aids.

2.03 GROUND WATER DETERMINATION

- A. Equipment: Pipe probe or small diameter casing for ground water elevation determination.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide labor, equipment, tools, test plugs, risers, air compressor, air hose, pressure meters, pipe probe, or any other device necessary for proper testing and inspection.
- B. Determine selection of test methods and pressures for gravity sanitary sewers based on ground water elevation.

3.02 VISUAL INSPECTION OF GRAVITY SANITARY SEWERS

- A. Check pipe alignment visually by flashing light between structures. Verify if alignment is true and no pipes are misplaced. In case of misalignment or damaged pipe, remove and relay or replace pipe segment.

3.03 MANDREL TESTING FOR GRAVITY SANITARY SEWERS

- A. Perform deflection testing on flexible and semi-rigid pipe to confirm pipe has no more than 5 percent deflection. Mandrel testing shall conform to ASTM D 3034. Perform testing no sooner than 30 days after backfilling of line segment, but prior to final TESTING of line segment.
- B. Pull approved mandrel by hand through sewer sections. Replace any section of sewer not passing mandrel. Mandrel testing is not required for stubs.
- C. Retest repaired or replaced sewer sections.

3.04 LEAKAGE TESTING FOR GRAVITY SANITARY SEWERS

A. Test Options:

1. Test gravity sanitary sewer pipes for leakage with low pressure air testing.
2. Test new or rehabilitated sanitary sewer manholes with water or low pressure air. Manholes tested with low pressure air shall undergo physical inspection prior to testing.
3. Perform leakage testing after backfilling of line segment, and prior to tie-in of service connections.
4. If no installed piezometer is within 500 feet of sewer segment, provide temporary piezometer for this purpose.

B. Compensating for Ground Water Pressure:

1. Where ground water exists, install pipe nipple at same time sewer line is placed. Use 1/2-inch capped pipe nipple approximately 10 inches long. Make installation through manhole wall on top of sewer line where line enters manhole.
2. Immediately before performing line acceptance test, remove cap, clear pipe nipple with air pressure, and connect clear plastic tube to nipple. Support tube vertically and allow water to rise in tube. After water stops rising, measure height in feet of water over invert of pipe. Divide this height by 2.3 feet/psi to determine ground water pressure to be used in line testing.

C. Low Air Pressure Test: When using this test conform to ASTM C 828, ASTM C 924, or ASTM F 1417, as applicable, with holding time not less than that listed in Table 02533-2.

1. Air testing for sections of pipe shall be limited to lines less than 36-inch average inside diameter.
2. Lines 36-inch average inside diameter and larger shall be tested at each joint. Minimum time allowable for pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch during joint test shall be 10 seconds, regardless of pipe size.
3. For pipe sections less than 36-inch average inside diameter:
 - a. Determine ground water level.
 - b. Plug both ends of pipe.
 - c. After manhole-to-manhole section of sanitary sewer main has been sliplined and prior to any service lines being connected to new liner, plug liner at each manhole with pneumatic plugs.
 - d. Pressurize pipe to 4.0 psig. Increase pressure 1.0 psi for each 2.3 feet of ground water over highest point in system. Allow pressure to stabilize for 2 to 4 minutes. Adjust pressure to start at 3.5 psig (plus adjustment for ground water table). See Table 02533-2 at end of this Section.
 - e. To determine air loss, measure time interval for pressure to drop to 2.5 psig. Time must exceed that listed in Table 02533-2 at end of this Section for pipe diameter and length. For sliplining, use diameter of carrier pipe.

F. Retest: Repair and retest any section of pipe which fails to meet requirements.

3.05 TEST CRITERIA TABLES

A. Low Pressure Air Test:

1. Times in Table 02533-2, Time Allowed For Pressure Loss From 3.5 psig to 2.5 psig, at end of this Section, are based on equation from TCEQ Design Criteria 317.2(a)(4)(B).

$T = 0.0850(D)(K)/(Q)$ where:

T	=	time for pressure to drop 1.0 pounds per square inch gauge in seconds
K	=	0.000419 DL, but not less than 1.0
D	=	average inside diameter in inches
L	=	length of line of same pipe size in feet
Q	=	rate of loss, 0.0015 ft ³ /min./sq. ft. internal surface

2. Since K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as given in Table 02533-3, Minimum Testing Times for Low Pressure Air Test.

Notes:

1. When two sizes of pipe are involved, compute time by ratio of lengths involved.
3. Lines with 27-inch average inside diameter and larger may be air tested at each joint.
4. Lines with average inside diameter greater than 36 inches must be air tested for leakage at each joint.
5. If joint test is used, perform visual inspection of joint immediately after testing.
6. For joint test, pipe is to be pressurized to 3.5 psi greater than pressure exerted by groundwater above pipe. Once pressure has stabilized, minimum times allowable for pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be 10 seconds.

3.06 LEAKAGE TESTING FOR MANHOLES

- A. After completion of manhole construction, wall sealing, or rehabilitation, but prior to backfilling, test manholes for water tightness using hydrostatic or vacuum testing procedures.
- B. Plug influent and effluent lines, including service lines, with suitably-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test; follow manufacturer's safety and installation recommendations. Place plugs minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged when lines entering manhole have not been backfilled.
- C. Vacuum testing:
 1. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions

02533-5 of 8

and safety precautions, inflate sealing element to recommended maximum inflation pressure; do not over-inflate.

2. Evacuate manhole with vacuum pump to 10 inches mercury (Hg), disconnect pump, and monitor vacuum for time period specified in Table 02533-4, Vacuum Test Time Table.
3. If drop in vacuum exceeds 1 inch Hg over specified time period tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

D. Perform hydrostatic exfiltration testing as follows:

1. Seal wastewater lines coming into manhole with internal pipe plug. Then fill manhole with water and maintain it full for at least one hour.
2. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.
3. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.

Table 02533-2
TESTING FOR SANITARY SEWERS

TIME ALLOWED FOR PRESSURE LOSS FROM 3.5 PSIG TO 2.5 PSIG

Pipe Dia. In.	Min Time min:sec	Length for minute Time ft	Time for Longer Length sec	Specification Time for Length (L) Shown (min:sec)										
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	500 ft	550 ft	600 ft
6	5:40	398	0.8548	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:25	7:07	7:50	8:33
8	7:33	298	1.5196	7:33	7:33	7:33	7:33	7:36	8:52	10:08	11:24	12:40	13:56	15:12
10	9:27	239	2.3743	9:27	9:27	9:27	9:54	11:52	13:51	15:50	17:48	19:47	21:46	23:45
12	11:20	199	3.4190	11:20	11:20	11:20	14:15	17:06	19:57	22:48	25:39	28:30	31:20	34:11
15	14:10	159	5.3423	14:10	14:10	17:48	22:16	26:43	31:10	35:37	40:04	44:31	48:58	53:25
18	17:00	133	7.6928	17:00	19:14	25:39	32:03	38:28	44:52	51:17	57:42	64:06	70:31	76:56
21	19:50	114	10.4708	19:50	26:11	34:54	43:38	52:21	61:05	69:48	78:32	87:15	95:59	104:42
24	22:40	99	13.6762	22:40	34:11	45:35	56:59	68:23	79:47	91:10	102:34	113:58	125:22	136:46

27	25:30	88	17.308 9	28:5 1	43:16	57:42	72:07	86:33	100:5 8	115:2 4	129:4 9	144:1 4	158:4 0	173:0 5
30	28:20	80	21.369 0	35:3 7	53:25	71:14	89:02	106:51	124:3 9	142:2 8	160:1 6	178:0 5	195:5 3	213:4 1
33	31:10	72	25.856 5	43:0 6	64:38	86:11	107:4 4	129:17	150:5 0	172:2 3	193:5 5	215:2 8	237:0 1	258:3 4

Table 02533-3
MINIMUM TESTING TIMES FOR LOW PRESSURE AIR TEST

Pipe Diameter (in)	Minimum Time (sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)
6	340	398	1.520 (L)
8	454	298	2.374 (L)
10	567	239	3.419 (L)
12	680	199	5.342 (L)
15	850	159	7.693 (L)
18	1020	133	10.471 (L)
21	1190	114	13.676 (L)
24	1360	100	17.309 (L)
27	1530	88	21.369 (L)
30	1700	80	25.856 (L)
33	1870	72	

Table 02533-4
VACUUM TEST TIME TABLE

Depth in Feet	Time in seconds by Pipe Diameter		
	48"	60"	72"
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
*	5.0	6.5	8.0
The values listed above have been extrapolated from ASTM C 924-85			

Table 02533-5
PIPE VS. MANDREL DIAMETER

Nominal Material and Wall Construction	Average Size I.D.	Minimum Mandrel Diameter (Inches)	(Inches)	(Inches)
PVC-Solid (SDR 26)	6	6	5.764	5.476
8	7.715	7.329		
10	9.646	9.162		
PVC-Solid (SDR 35)	12	12	11.737	11.150
15	14.374	13.655		
18	17.629	16.748		
21	20.783	19.744		

02533-7 of 8

24	23.381	22.120		
27	26.351	25.033		
PVC-Truss	8	7.750	7.363	
10	9.750	9.263		
12	11.790	11.201		
15	14.770	14.032		
PVC-Profile (ASTM	F 794)	12	11.740	11.153
15	14.370	13.652		
18	17.650	16.768		
21	20.750	19.713		
24	23.500	22.325		
27	26.500	25.175		
30	29.500	28.025		
36	35.500	33.725		
42	41.500	39.425		
48	47.500	45.125		
HDPE-Profile	18	18.000	17.100	
21	21.000	19.950		
24	24.000	22.800		
27	27.000	25.650		
30	30.000	28.500		
36	36.000	34.200		
42	42.000	39.900		
48	48.000	45.600		
54	54.000	51.300		
60	60.000	57.000		
Fiberglass	12	12.85	11.822	
(Class SN 46)	18	18.66	17.727	
20	20.68	19.646		
24	24.72	23.484		
30	30.68	29.146		
36	36.74	34.903		
42	42.70	40.565		
48	48.76	46.322		
54	54.82	52.079		
60	60.38	57.361		
END OF SECTION				

Section 02535

NON-METALLIC UTILITY LINE MARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnishing and installation of utility marking tape capable of being detected electronically and marker posts, all in conjunction with backfill of non-metallic utility lines.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No separate payment will be made for non-metallic utility line marking. Include the cost of such marking in related work.~~

~~2. Refer to Section 01270 - Measurement and Payment for Unit Price Procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for Work in this Section is included in the total Stipulated Price.

1.03 DEFINITIONS

- A. Non-metallic utility line. Pressure or gravity flow pipelines constructed predominantly of PVC, HDPE, Clay, or other non-ferrous materials.

1.04 REFERENCE STANDARDS

- A. ASTM D 2103 - Specification for Polyethylene Film and Sheeting

1.05 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01300 - Submittals.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Metalized tape shall be manufactured specifically for warning and identification of buried utility lines. Tapes shall be inert plastic specially formulated for prolonged use underground and shall be resistant to alkalis, acids and other destructive agents found in the soil. Tape shall be provided in rolls, 3-inch minimum width, color coded for intended service with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be "CAUTION BURIED [SEWER] [WATER] PIPELINE" or similar wording. Color code and letter coding shall be permanent, unaffected by moisture and other substances contained in trench backfill material.

- B. Color Codes shall be as follows:
 - 1. Water Pipeline: Blue
 - 2. Sewer Pipeline (both gravity and pressure): Green
- C. Buried warning, identification, and locator tape for use in trenches containing non-metallic water and sewer lines shall be 5.5-mil composition film containing one layer of metalized foil laminated between two layers of inert plastic film. Tape shall be detectable by cable locating equipment used to locate underground utility pipelines.
- D. Drivable, Flexible, Composite Utility Marker: Shall be durable, reinforced composite posts manufactured specifically for warning and identification of buried utility lines. Posts shall be 3-1/2 inches minimum width and a minimum of 78 inches in length, color coded for intended service with a 3-inch wide warning and identification decal attached. Warning and identification shall be "CAUTION BURIED [SEWER] [WATER] PIPELINE" or similar wording. Code and letter coloring shall be permanent.

PART 3 EXECUTION

3.01 INSTALLATION OF BURIED WARNING, IDENTIFICATION, AND LOCATOR TAPE.

- A. Install tape continuously in backfill directly over buried utility pipeline, 6 to 24 inches below finished grade. Terminate marked segment no farther than 3 feet from an accessory of the pipeline (manholes, cleanouts, valve boxes, etc.).

3.01 INSTALLATION OF DRIVABLE, FLEXIBLE, COMPOSITE UTILITY MARKERS.

- A. Location: Install flexible, composite utility markers in unpaved / undeveloped areas, highway, railroad, fence crossings, changes in pipeline direction, and as directed by the Resident Project Representative.
- B. Installation: Install in a true, vertical plane directly over or immediately adjacent (within 2 feet) to the utilities to which they relate. Posts shall be driven to provide an anchoring depth of 30 inches.

END OF SECTION

SECTION 02580
PAVEMENT MARKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pavement striping and handicap symbols.
2. Primer adhesive.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installations instructions including guidelines and templates as required.
- B. Samples: Submit test samples when requested.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Handicap parking space marking shall comply with state of Texas and city requirements.

1.4 PROJECT CONDITIONS

- A. Apply marking when surfaces are thoroughly dry and when air temperature is above 40 degrees F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Sherwin-Williams.
2. Pratt & Lambert.

2.2 MATERIALS

A. Latex Paint:

1. Colors: White, yellow, red, and blue as required.
2. Acceptable products - Sherwin-Williams:
 - a. White or Yellow: Set Fast Latex Traffic Marking Paint or Acrylic Water Borne Traffic Marking Paint.
 - b. Red or Blue: Metalatex Semi-Gloss Coatings.
3. Acceptable Products - Devoe:
 - a. White or Yellow: #416XX Traffic-Line Water Based Traffic Marking Paint.
 - b. Red or Blue: #83XX Mirrolac W.B.

- B. Paint Primer: As recommended by paint manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure new concrete and asphaltic concrete paving has cured for 30 days minimum prior to application of pavement marking.

3.2 PREPARATION

- A. Clean surface of scale, dirt, mud, sand gravel, oil, grease and other foreign material.
- B. On portland cement concrete, apply primer for striping as recommended by paint manufacturer to act as barrier coat with curing compound.
- C. Layout lines and symbols in advance of making application. Space control points at intervals to ensure accurate location of markings.

3.3 PAINT STRIPING APPLICATION

- A. Lay out markings using guide line, templates and forms as required. Use white or yellow, match existing paint to distinguish parking spaces. Use red paint for fire lanes.
- B. Apply 4" wide stripes at manufacturer's recommended rate.
- C. Stencil "FIRE LANE - NO PARKING" in 4" high white block letters on red background 6" high and of appropriate length for lettering background at intervals not closer than 25 ft. and not farther apart than 50 ft. on curbs and pavement throughout length of fire lane.
- E. Place suitable warning signs near work site to alert approaching traffic from all directions to prevent damage to newly painted surfaces.

3.4 PROTECTION

- A. Protect pavement markings in accordance with manufacturer's instructions.

END OF SECTION

Section 02611

REINFORCED CONCRETE PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforced concrete pipe for sanitary sewers and storm sewers.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No separate payment will be made for reinforced concrete pipe under this Section. Include cost in unit price work as specified in the following Sections:~~

~~a. Section 02426 - Sanitary Sewer Line in Tunnel.~~

~~b. Section 02531 - Gravity Sanitary Sewers.~~

~~c. Section 02631 - Storm Sewers.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
- B. ASTM C 443 - Joints for Circular Concrete Sewer and Culvert Pipe.
- C. ASTM C 497 - Method of Testing Concrete Pipe, Sections, or Tile.
- D. ASTM C 506 - Reinforced Concrete Arch Culvert, Storm Drain and Sewer Pipe
- E. ASTM C 507 - Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe.
- F. ASTM C 655 - Reinforced Concrete D-load Culvert, Storm Drain and Sewer Pipe.
- G. ASTM C 822 - Standard Definitions and Terms Relating to Concrete Pipe and Related Products.
- H. ASTM C 877 - Standard Specification for External Sealing Bands for Non circular Concrete Sewer, Storm Drain, and Culvert Pipe.

1.04 SUBMITTALS

~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~

- B. Submit complete product data for pipe, fittings and gaskets for approval. Indicate conformance to appropriate reference standards.

- C. Submit certificates by a testing laboratory, hired and paid by the manufacturer, that concrete pipes meet applicable standards when tested in accordance with ASTM C 497.

- D. For jacking pipe, submit drawings and data describing grouting port design and closure procedures when required by Section 02431 - Tunnel Grout, including liner repair, as applicable.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE

- A. Circular reinforced concrete pipe shall conform to requirements of ASTM C 76, for Class III wall thickness. Joints shall be rubber gasketed conforming to ASTM C 443.
- B. Reinforced concrete arch pipe shall conform to the requirements of ASTM C 506 for Class A-III. Joints shall conform to ASTM C 877.
- C. Reinforced concrete elliptical pipe, either vertical or horizontal, shall conform to the requirements of ASTM C 507 for Class VE-III for vertical or Class HE-III for horizontal. Joints shall be rubber gaskets conforming to ASTM C 877.
- D. Reinforced concrete D-load pipe shall conform to the requirements of ASTM C 655.

2.02 GASKETS

- A. When no contaminant is identified, furnish rubber gasket conforming to ASTM C 443 for circular reinforced concrete pipe and rubber gasket conforming to ASTM C 877 for reinforced concrete elliptical pipe.
- B. Pipes to be installed in potentially contaminated areas, especially where free product is found near the elevation of the proposed sewer, shall have the following gasket materials for the noted contaminants:

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by the pipe manufacturer

2.03 LINERS FOR SANITARY SEWER PIPE

- A. Reinforced concrete pipe for sanitary sewers shall be PVC lined.
- B. Reinforced concrete pipes to be installed in potentially contaminated areas shall have liners that are recommended by the manufacturer as resistant to contaminants identified in the Phase II Environmental Site Assessment Report.

2.04 SOURCE QUALITY CONTROL

- A. Representatives of Resident Project Representatives will inspect manufacturer's plant and casting operations as deemed necessary.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Conform to requirements of the following Sections, as applicable:

~~1. Section 02446 - Pipe and Casing Augering~~

2. Section 02531 - Gravity Sanitary Sewers
 3. Section 02720 - Storm Drainage System.
 - ~~4. Section 02441 - Microtunneling and Pipe Jacked Tunnels~~
- B. Install reinforced concrete pipe in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 02720
STORM DRAINAGE SYSTEM

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes storm drainage systems consisting of storm sewers, inlets, culverts and other drainage structures as shown on the Drawings and specified herein from a point 5 feet outside the buildings to the point of disposal.
- B. Related Sections: The following Sections contain requirements that relate to this section.
- | | | |
|----|---------------------------|----------------------------|
| 1. | Division 2 Section 02200: | Earthwork and Site Grading |
| 2. | Division 2 Section 02516: | Cast-in-Place Concrete |

1.3 SUBMITTALS

- A. General: Submit the following:
1. Product data and certification of pipe quality from the manufacturer prior to installation.
 2. A trench safety plan for all excavation in excess of 5 feet which meets all requirements of Texas state law and O.S.H.A.
 3. Testing laboratory certification of specified materials.
 4. Compaction tests for embedment and backfill.
 5. Shop drawings and manufacturer's certifications for precast concrete inlets.
 6. Shop drawings, product data, mix designs and materials certifications for reinforced concrete structures.
 7. Shop drawings for grates and castings.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Concrete Pipe: (15" and larger - public). Reinforced concrete culvert pipe conforming to ASTM C76, Class III, with tongue and groove joints. Lifting holes in pipe sections are not permissible.
- B. Corrugated Polyethylene Pipe: (15" and smaller – private) Polyethylene pipe with corrugated exterior and smooth interior conforming to ASTM F405. Use fittings manufactured specifically for use with this pipe.
- C. PVC Pipe: (12" and smaller – private) PVC pipe per ASTM D-3034, SDR-35.
- D. Aluminized Steel: (8" – private) Type 2 to meet all requirements by Contech or approved

equal.

- E. Cement Mortar: One part cement and two parts clean sharp sand with lime added in an amount not exceeding twenty-five percent of volume of cement. Mix dry and then wet to proper consistency for use. Use no mortars that have stood for more than one hour.
- F. Reinforced Concrete: Reinforced concrete conforming to Section 02516 for inlets, culverts and headwalls.
- G. Precast Inlets: Precast inlets shall be reinforced concrete with 4500 psi concrete at 28 days and grade 60 reinforcing steel.
- H. Jointing Materials:
 - 1. Reinforced Concrete Pipe: Cold applied preformed plastic gaskets suitable for sealing joints of tongue and groove concrete pipe. Use "Ram-nek" brand or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Pipe Trenches:
 - 1. Excavate the pipe trenches to the widths necessary for the proper laying of the pipe but in no case wider than 24 inches plus the outside diameter of the pipe and keeping the banks as nearly vertical as practicable to at least 12 inches above top of pipe. In paved areas, maintain the trench walls vertical and sheeted, if required, with the clearance between the pipe and trench wall or back of sheeting not exceeding 12 inches. Excavate the bottom of the trenches to a depth as indicated on the plans and replace any over excavation with suitable compacted material.
 - 2. Remove for the full width of the excavation soft, spongy, or otherwise unstable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work and replace with approved fill material.
 - 3. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls of excavation for other structures, and to safeguard the workmen, excavate the trench or excavation for other structures to such width that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.
 - 4. Place embedment as foundation for pipe in accordance with City standard details.

3.2 PIPE INSTALLATION

- A. General
 - 1. Pipe Handling: All pipe, fittings and specials shall be handled in such a manner as not to damage the material. All pipe and fittings handled with clamps or slings must meet with the approval of the Owner; no hooks shall be permitted. When it becomes necessary to deflect the pipe to avoid obstructions, the deflection of each joint must

- be within the limits provided by the manufacturer and be approved by the Owner.
2. Laying Underground Conduit Pipe: Previous to being lowered into the trench, each pipe shall be carefully inspected; and those not meeting specifications shall be rejected and either destroyed or removed from the job. All lumps or excrescences on the ends of conduit shall be removed before it is lowered into the trench. No pipe shall be laid except in the presence of the Owner, unless otherwise specified; and the Owner may order the removal of and re-laying of any pipe not so laid. The pipe and specials shall be so laid in the trench that after the project is completed the interior surface shall conform accurately to the grade and alignment indicated on the plans. Bell holes shall be excavated and all pipe shall be carefully adjusted to fit snugly in the bedding so that the entire length bears on bedding material with no wedging or blocking to hold up the bell. All pipe shall be laid in the dry, regardless of the type of joint used. Pipes shall be laid with the bell or groove end up unless otherwise approved by the Owner; and, in any event, shall be laid with the bell or collar away from the last section placed. Before laying the pipe, the interior of the joints shall be carefully bored smooth and clean and the annular space shall be kept free from dirt, stones or water. Pipe shall be installed and joints made up in complete conformance with the instructions and recommendations regarding proper installation and assembly furnished by the manufacturer. Proper facilities shall be provided for hoisting and lowering the section of the pipe into the trench without disturbing the prepared foundation and the sides of the trench. All pipe shall be so laid that the contact in the joint between two lengths of pipe shall be uniform throughout the circumference of the joint. Where curves in the alignment are indicated on the drawings, standard pipe (short sections of pipe or bevels) shall be used with the outside edge of the joint pulled away from the seat to make a smooth curve.

B. Drainage Structures

1. Construct concrete structures in conformity with City and TxDOT standard details. Design and construct forms so that they may be removed without injury to the concrete. Thoroughly compact the concrete and leave forms in place for at least 24 hours after concrete is poured. Cure the concrete for at least 5 days after removal of forms. Thoroughly clean honeycomb places, saturate with water and point up with mortar.

- C. Inlets: Inlets shown on the plans may be precast or poured-in-place reinforced concrete at the Contractor's option.

3.3 BACKFILLING FOR PIPE AND STRUCTURES

- A. After the pipe has been installed on specified embedment, place specified backfill at a moisture content which will facilitate compaction alongside the pipe in layers not exceeding 6 inches loose measure in depth. Thoroughly compact the fill under the haunches of the pipe and compact each layer by rolling or tamping with mechanical rammers. Continue this method of filling and compacting until the fill is 12-inches above the pipe, then place the remainder of the backfill, in lifts not exceeding 9-inches. Operate heavy equipment in a manner so that no damage to the pipe will result. Compact backfill to a point 12 inches above the pipe to not less than 95 percent of maximum dry unit weight as determined by ASTM D698. Compact backfill material 12 inches and more above the pipe to not less than 95 percent of the maximum dry unit weight as determined by ASTM D698 under pavement and 90 percent elsewhere.

- B. Place and compact backfill for drainage structures in the same manner as specified above for pipe, except allow the concrete to cure for not less than five days before placing the backfill.

END OF SECTION

Section 02741

ASPHALTIC CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface courses of compacted mixture of coarse and fine aggregates and asphaltic material.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment for asphaltic concrete pavement is on square yard basis. Separate pay items reused for each different required thickness of pavement.~~
- ~~2. Payment for asphaltic concrete pavement includes payment for associated work performed in accordance with Section 02743 - Tack Coat.~~
- ~~3. Payment for asphaltic concrete in miscellaneous areas is on a square yard basis. Miscellaneous areas include tie-in to existing driveways.~~
- ~~4. No separate payment will be made under this section for asphaltic concrete provided for Section 02951 - Pavement Replacement for Utility Construction~~
- ~~5. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~
- ~~6. Refer to Paragraph 3.08 for unit price adjustments.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 33 - Standard Specification for Concrete Aggregates.
- B. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- C. ASTM C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. TxDOT Tex-126-E - Molding, Testing, and Evaluation of Bituminous Black Base Material.
- E. TxDOT Tex-106-E - Method of Calculating the Plasticity Index of Soils.
- F. TxDOT Tex-203-F - Sand Equivalent Test.
- G. TxDOT Tex-204-F - Design of Bituminous Mixtures.
- H. TxDOT Tex-207-F - Determination of Density of Compacted Bituminous Mixtures.
- I. TxDOT Tex-208-F - Test for Stabilometer Value of Bituminous Mixtures.

J. TxDOT Tex-217-F - Determination of Deleterious Material and Decantation Test for Coarse Aggregates.

K. TxDOT Tex-227-F - Theoretical Maximum Specific Gravity of Bituminous Mixtures

1.04 SUBMITTALS

~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~

B. Submit certificates that asphaltic materials and aggregates meet requirements of Article 2.01, Materials, of this Section.

C. Submit proposed design mix and test data for each type and strength of surface course in Work.

D. Submit manufacturer's description and characteristics of mixing plant for approval.

D. Submit manufacturer's description and characteristics of spreading and finishing machine for approval.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate: Gravel or crushed stone, or combination thereof, that is retained on No. 10 sieve, uniform in quality throughout and free from dirt, organic or other injurious matter occurring either free or as coating on aggregate. Aggregate shall conform to ASTM C 33 except for gradation. Furnish rock or gravel with Los Angeles abrasion loss not to exceed 40 percent by weight when tested in accordance with ASTM C 131.

B. Fine Aggregate: Sand or stone screenings or combination of both passing No. 10 sieve. Aggregate shall conform to ASTM C 33 except for gradation. Use sand composed of sound, durable stone particles free from loams or other injurious foreign matter. Furnish screenings of same or similar material as specified for coarse aggregate. Plasticity index of that part of fine aggregate passing No. 40 sieve shall be not more than 6 when tested by Tex-106-E. Sand equivalent shall have a minimum value of 45 when tested by Tex-203-F.

C. Composite Aggregate: Conform to following limits when graded in accordance with ASTM C 136.

GRADUATION OF COMPOSITE AGGREGATE	
Sieve Size	Percent Passing
1/2"	100
3/8"	85 to 100
#4	50 to 70
#10	32 to 42
#40	11 to 26
#80	4 to 14
#200	1 to 6*
*2 to 8 when Test Method Tex – 200 - F, Part II (Washed Sieve Analysis) is used	

- D. Asphaltic Material: Moisture-free homogeneous material which will not foam when heated to 347 degrees F, meeting following requirements:

VISCOSITY GRADE				
TEST	AC-10		AC-20	
	Min.	Max.	Min.	Max.
Viscosity, 140° F stokes	1000	± 200	2000	± 400
Viscosity, 275° F stokes	1.9	-	2.5	-
Penetration, 77° F, 100g, 5 sec.	85	-	55	-
Flash Point, C.O.C., F.	450	-	450	-
Solubility in trichloroethylene, percent	99.0	-	99.0	-
Tests on residues from thin film oven tests:				
Viscosity, 140° F stokes		3000	-	6000
Ductility, 77° F, 5 cms per min., cms	100	-	70	-
Spot tests	Negative for all grades			

1. Material shall not be cracked.

2.02 EQUIPMENT

- A. Mixing Plant: Weight-batching or drum mix plant with capacity for producing Continuously mixtures meeting specifications. Plant shall have satisfactory conveyors, power units, aggregate handling equipment, hot aggregate screens and bins, and dust collectors. Provide equipment to supply materials adequately in accordance with rated capacity of plant and produce finished material within specified tolerances. Following equipment is essential:

1. Cold aggregate bins and proportioning device.
2. Dryer.
3. Screens.
4. Aggregate weight box and batching scales.
5. Mixer.
6. Asphalt storage and heating devices.
7. Asphalt measuring devices.
8. Truck scales.

- B. Bins: Separate aggregate into minimum of four bins to produce consistently uniform grading and asphalt content in completed mix.

2.03 MIXES

- A. Employ a certified testing laboratory to prepare design mixes. Test in accordance with Tex-126-E or Tex-204-F and Tex-208-F.

- B. Density and Stability Requirements:

Percent Density		Percent	HVEEM Stability Percent
<u>Min.</u>	<u>Max.</u>	<u>Optimum</u>	<u>Not Less Than</u>
94.5	97.5	96	35

- C. Proportions for Asphaltic Material: Provide 4 to 8 percent of mixture by weight. Aggregate by weight shall not contain more than 1.0 percent by weight of fine dust, clay-like particles, or silt when tested in accordance with Tex-217-F, Part II.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted base course is ready to support imposed loads.
- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Prime Coat: If indicated on the Drawings, apply a prime coat conforming to requirements of Section 02742 - Prime Coat. Do not apply a tack coat until primed base has cured to satisfaction of Resident Project Representative.
- B. Tack Coat: Conform to requirements of Section 02743 - Tack Coat.
- C. Prepare subgrade in advance of asphaltic concrete paving operation.
- D. Do not use cutback asphalt during the period of April 16 to September 15.

3.03 PLACEMENT

- A. Do not place asphaltic mixture when air temperature is below 50 degrees F and falling. Mixture may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.
- B. Haul prepared and heated asphaltic concrete mixture to the project in tight vehicles previously cleaned of foreign material. Mixture shall be at temperature between 250 degrees F and 325 degrees F when laid.
- C. Spread material into place with approved mechanical spreading and finishing machine of screening or tamping type.
- D. Surface Course Material: Surface course 2 inches or less in thickness may be spread in one lift. Spread lifts in such manner that, when compacted, finished course will be smooth, of uniform density, and will be to section, line and grade as shown. Place construction joints on surface courses to coincide with lane lines or as directed by Resident Project Representative.
- E. Place courses as nearly continuously as possible. Pass roller over unprotected ends of Freshly laid mixture only when mixture has cooled. When work is resumed, cut back laid material to produce slightly beveled edge for full thickness of course. Remove old material which has been cut away and lay new mix against fresh cut.
- F. When new asphalt is laid against existing or old asphalt, existing or old asphalt shall be saw cut full depth to provide straight smooth joint.
- G. In restricted areas where use of paver is impractical, spread and finish asphalt by

Mechanical compactor. Use wood or steel forms, rigidly supported to assure correct grade and cross section. Carefully place materials to avoid segregation of mix. Do not broadcast material. Remove any lumps that do not break down readily. Place asphalt courses in same sequence as if placed by machine.

3.04 COMPACTION

- A. Begin rolling while pavement is still hot and as soon as it will bear roller without undue displacement or hair cracking. Keep wheels properly moistened with water to prevent adhesion of surface mixture. Do not use excessive water.
- B. Compress surface thoroughly and uniformly, first with power-driven, 3-wheel, or tandem rollers weighing from 8 to 10 tons. Obtain subsequent compression by starting at side and rolling longitudinally toward center of pavement, overlapping on successive trips by at least one-half width of rear wheels. Make alternate trips slightly different in length. Continue rolling until no further compression can be obtained and rolling marks are eliminated. Complete rolling before mixture temperature drops below 175 degrees F.
- C. Use tandem roller for final rolling. Double coverage with approved pneumatic roller on asphaltic concrete surface is acceptable after flat wheel and tandem rolling has been completed.
- D. Along walls, curbs, headers and similar structures, and in locations not accessible to rollers, compact mixture thoroughly with lightly oiled tamps.
- E. Compact binder course and surface course to density not less than 94 percent nor more than 98 percent of the maximum possible density of voidless mixture composed of same materials in like proportions.

3.05 TOLERANCES

- A. Furnish templates for checking surface in finished sections. Maximum deflection of templates, when supported at center, shall not exceed 1/8 inch.
- B. Completed surface, when tested with 10-foot straightedge laid parallel to center line of pavement, shall show no deviation in excess of 1/8 inch in 10 feet. Correct any surface not meeting this requirement.

3.06 FIELD QUALITY CONTROL

- A. ~~Testing will be performed under provisions of Section 01454 - Testing Laboratory Services.~~
- B. Minimum of one core will be taken at random locations per 1000 feet per lane of roadway or 500 square yards of base to determine in-place depth and density.
- C. In-place density will be determined in accordance with Tex-207-F and Tex-227-F from cores or sections. Other methods of determining in-place density, which correlate satisfactorily with results obtained from roadway specimens, may be used when approved by Engineer.
- D. Contractor may, at his own expense, request three additional cores in vicinity of cores indicating nonconforming in-place depths. In-place depth at these locations shall be average depth of four cores.
- E. Fill cores and density test sections with new compacted asphaltic concrete.

3.07 NONCONFORMING PAVEMENT

- A. Remove and replace any non – conforming pavement.
- B. Remove and replace areas of asphalt found deficient in thickness by more than 10 percent. Use new asphaltic base of thickness shown on Drawings.
- C. Replace nonconforming pavement sections.

3.08 UNIT PRICE ADJUSTMENT

- A. Unit price adjustments shall be made for in-place depth determined by cores as follows:
 - 1. Adjusted Unit Price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price bid.
 - 2. Adjustment shall apply to lower limit of 90 percent and upper limit of 105 percent of unit price.
 - 3. Average depth below 90 percent may be rejected by Engineer.

3.09 PROTECTION

- A. Do not open pavement to traffic until 12 hours after completion of rolling, or as shown on Drawings.
- B. Maintain asphaltic concrete pavement in good condition until completion of Work.
- C. Repair defects immediately by replacing asphaltic concrete pavement to full depth.

END OF SECTION

Section 02742

PRIME COAT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prime coat for asphaltic concrete paving

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No separate payment will be made for prime coat under this Section. Include payment in unit price for material being primed.~~
- ~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 SUBMITTALS

- ~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~
- B. Submit product data for proposed prime coat.
- C. Submit report of recent calibration of distributor.

PART 2 PRODUCTS

- A. Cutback Asphalt
- B. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F and which meets following requirements:
- C. Asphalt material for prime coat shall be MC-30 or MC-70 and shall meet following requirements:

PROPERTIES	TYPE - GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
Water, Percent	---	0.2	---	0.2
Flash Point, T.O.C., °F	100	---	100	---
Kinematic Viscosity at 140°F, cst	30	60	70	140

- 2. Distillate shall be as follows, expressed as percent by volume of total distillate to 680 degrees F:

TEMPERATURE	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
to 437°F	---	25	---	20
to 500°F	40	70	20	60
to 600°F	75	93	65	90
Residue from 680°F Distillation, Volume, Percent	50	---	55	---

3. Tests on Distillation Residue:

TEST	TYPE-GRADE			
	MC-30		MC-70	
	MIN.	MAX.	MIN.	MAX.
Penetration at 77°F, 100g, 5 sec., cm	120	250	120	250
Ductility at 77°F, 5 cm/min., cm	100*	---	100*	---
Solubility in Trichloroethylene, %	99	---	99	---
Spot Test	All Negative			

*If penetration of residue is more than 200 and ductility at 77 degrees F is less than 100 cm, material will be acceptable if its ductility at 60 degrees F is more than 100 cm.

2.02 EMULSIFIED PETROLEUM RESIN

- A. EPR-1 Prime: Slow curing emulsion of petroleum resin and asphalt cement conforming to the following requirements:

PROPERTIES	MIN.	MAX.
Fural Viscosity at 77°F, Sec	14	40
Residue by Evaporation, % by Weight	60	-
Sieve Test, %	-	0.1
Particle Charge Test	Positive	
Tests on the Distillation Residue:		
Flash Point, COC (F)	400	-
Kinematic Viscosity @ 140 F (cst)	190	350

- B. For use, EPR-1 may be diluted with water up to a maximum three parts water to one part EPR-1 in order to achieve desired concentration of residual resin/asphalt to facilitate application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify base is ready to support imposed loads.
- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Thoroughly clean base course surface of loose material by brooming prior to application of prime coat.
- B. Prepare sufficient base in advance of paving for efficient operations.

3.03 APPLICATION, BASIC

- A. Apply prime coat with approved type of self-propelled pressure distributor. Distribute prime coat evenly and smoothly under pressure necessary for proper distribution.
- B. Keep storage tanks, piping, retorts, booster tanks, and distributors used in handling asphaltic materials clean and in good operating condition. Conduct operations so that asphaltic material does not become contaminated.
- C. If yield of asphaltic material appears to be in error, recalibrate distributor prior to continuing work.
- D. Maintain the surface until Work is accepted by Owner.

3.04 APPLICATION, CUTBACK ASPHALT

- A. Do not place prime coat when air temperature is below 60 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 50 degrees F and rising.
- B. Distribute at rate of 0.25 to 0.35 gallons per square yard.
- C. Equipment shall be capable of reporting temperature of asphaltic material in heating equipment and in distributor, for determining rate of application, and for obtaining uniformity at junction of two distributor loads. Maintain in accurate working order, including recording thermometer at storage heating unit at all times.
- D. Temperature of application shall be based on temperature-viscosity relationship that will permit application of asphalt with viscosity of 100 to 125 centistokes. Maintain asphalt within 15 degrees F of temperature required to meet viscosity. Selected temperature shall be within following range.

<u>Prime Coat Type</u>	<u>Minimum (°F)</u>	<u>Maximum (°F)</u>
MC-30	70	150
MC-70	125	175

- E. Do not allow temperature of MC-30 to exceed 175 degrees F at any time.
- F. Do not allow temperature of MC-70 to exceed 200 degrees F at any time.

3.05 APPLICATION, EMULSIFIED PETROLEUM RESIN

- A. Do not place prime coat when air temperature is below 36 degrees F and falling.
- B. Distribute at rate of 0.15 to 0.25 gallons per square yard.

3.06 PROTECTION

- A. Prevent traffic or placement of subsequent courses over freshly applied prime coat until authorized by Resident Project Representative.

END OF SECTION

Section 02743

TACK COAT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tack coat for asphaltic concrete paving.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

~~1. No separate payment will be made for tack coat under this Section. Include payment in unit price for asphaltic pavements.~~

~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM D 244 - Standard Test Methods for Emulsified Asphalts.

1.04 SUBMITTALS

~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~

- B. Submit product data for proposed tack coat.
- C. Submit report of recent calibration of distributor.

PART 2 PRODUCTS

2.01 CUTBACK ASPHALT

- A. Provide moisture-free homogeneous material which will not foam when heated to 347 degrees F and which meets following requirements:

1. Asphalt material for tack coat: RC-250 and meet following:

PROPERTIES	RC - 250	
	MIN.	MAX.
Water, Percent	---	0.2
Flash Point, T.O.C., °F	80	---
Kinematic Viscosity at 140°F, cst	250	400

2. Distillate: Expressed as percent by volume of total distillate to 680 F:

TEMPERATURE	RC - 250

	MIN.	MAX.
to 437°F	40	75
to 500°F	65	90
to 600°F	85	---
Residue from 680°F Distillation, Volume, Percent	70	---

3. Tests on Distillation Residue:

PROPERTIES	RC – 250	
	MIN.	MAX.
Penetration at 77°F, 100g, 5 sec.	100	150
Ductility at 77°F, 5 cm/min. cms	100	---
Solubility in Trichloroethylene, %	99	---
Spot Test	All Negative	

2.02 EMULSION

- A. Provide homogeneous material which shall show no separation of asphalt after mixing and shall meet the viscosity requirements at any time within 30 days after delivery.

1. Emulsion material for tack coat: SS-1 and meet following:

PROPERTIES	SS – 1	
	MIN.	MAX.
Furol Viscosity at 77°F, sec.	30	100
Residue by Distillation, %	60	---
Oil Portion of Distillate, %	---	2
Sieve Test, %	---	0.1
Miscibility (Standard Test)	Passing	Passing
Cement Mixing, %	---	2.0
Storage Stability, 1 Day, %	---	1
Test on Residue: Penetration at 77°F, 100g, 5 sec. Solubility in Trichloroethylene, % Ductility at 77°F, 5 cm/min., cms	120 97.5 100	160 --- ---

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted base is ready to support imposed loads.

- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Thoroughly clean base course or concrete surface of loose material by brooming prior to application of tack coat.

3.03 APPLICATION

- A. Apply tack coat uniformly by use of approved distributor at rate not to exceed 0.05 gallons per square yard of surface.
- B. Paint contact surfaces of curbs and structures, and joints with thin uniform coat of tack coat.
- C. Cutback Asphalt:
 - 1. Do not place tack coat when air temperature is below 50 degrees F and falling. Materials may be placed when air temperature taken in shade and away from artificial heat is above 40 degrees F and rising.
 - 2. Temperature of tack coat shall be between 125 degrees F and 180 degrees F when applied.
 - 3. Do not heat tack coat above 200 degrees F at any time.

3.04 PROTECTION

- A. Prevent traffic or placement of subsequent courses over freshly applied tack coat until authorized by Resident Project Representative.

END OF SECTION

Section 02751

CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Portland cement concrete paving.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

~~1. Payment for concrete paving is on square yard basis. Separate pay items are used for each different required thickness of pavement.~~

~~2. Payment for concrete paving, high early strength, is on square yard basis.~~

~~3. Measurement for utility projects: Match actual pavement replaced but no greater than maximum pavement replacement limits shown on Drawings.~~

~~a. When removed pavement is greater than one half of pavement lane width or within 18 inches of longitudinal joint, replace pavement for full lane width or to nearest longitudinal joint.~~

~~b. No payment will be made for work outside pavement limits or in areas removed or replaced for Contractor's convenience. Maximum payment limits are shown on Drawings. When extent of pavement replacement is increased to full lane width or to nearest longitudinal joint, maximum payment limits are increased to same extent.~~

~~4. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

~~5. Refer to Paragraph 3.15, Unit Price Adjustment.~~

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

B. ASTM A 185 - Standard Specifications for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

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

D. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.

E. ASTM C 33 - Standard Specifications for Concrete Aggregates.

F. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

G. ASTM C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

H. ASTM C 42 - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

- I. ASTM C 78 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third Point Loading).
- J. ASTM C 94 - Standard Specification for Ready-Mixed Concrete.
- K. ASTM C 131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- L. ASTM C 136 - Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- M. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- N. ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
- O. ASTM C 150 - Standard Specification for Portland Cement.
- P. ASTM C 174 - Standard Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores.
- Q. ASTM C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- R. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- S. ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.
- T. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete.
- U. TxDOT Tex-203-F - Sand Equivalent Test.
- V. TxDOT Tex-406-A - Material Finer than 75 Fm (No. 200) Sieve In Mineral Aggregates (Decantation Test for Cement Aggregates).

1.04 SUBMITTALS

- ~~A. Conform to requirements of Section 01330 – Submittal Procedures.~~
- B. 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.
- C. Submit for approval manufacturer's description and characteristics for mixing equipment, and for traveling form paver, when proposed for use.
- D. Submit manufacturer's certificates giving properties of reinforcing steel. Include certificate of compliance with ASTM A 82. Provide specimens for testing when required by Engineer.

1.05 HANDLING AND STORAGE

- A. Do not mix different classes of aggregate without written permission of Engineer.
- B. Class of aggregate being used may be changed before or during Work with written permission of Engineer. Comply new class with specifications.
- C. Reject segregated aggregate. Before using aggregate whose particles are separated by size, mix them uniformly to grading requirements.

D. Reject aggregates mixed with dirt, weeds, or foreign matter.

E. Do not dump or store aggregate in road bed.

PART 2 PRODUCTS

2.01 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 Engineer. 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 Engineer.

B. Water: Conform to requirements for water in ASTM C 94.

C. Coarse Aggregate: Crushed stone, gravel, or combination thereof, which is clean, hard, 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:

<u>Item</u>	<u>Percent by Weight of Total Sample</u> <u>Maximum</u>
Clay lumps and friable particles	3.0
Material finer than 75- μ m (No. 200) sieve:	
Concrete subject to abrasion	3.0*
All Other concrete	5.0*
Coal and lignite:	
Where surface appearance of concrete	0.5
All other concrete	1.0

* In case of manufactured sand, when material finer than 75- μ m (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 12 inch to No. 4 sieve) to requirements of ASTM C 33. Use gradation within following limits when graded in accordance with ASTM C 136:

<u>Sieve Designation (Square Openings)</u>	<u>Percentage by Weight</u>
Retained on 1:" sieve	0
Retained on 12"sieve	0 to 5
Retained on : " sieve	30 to 65
Retained on d" 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)	Percentage 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

- 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: Class C 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 30 percent by absolute volume of cementitious material in mix design. Cement content may be reduced when strength requirements can be met. Note: When fly ash is used, term "cement" is defined as cement plus fly ash.
- F. Air Entraining Agent: Furnish air-entraining agent conforming to requirements of ASTM C 260.
- G. Water Reducer: Water reducing admixture conforming to requirements of ASTM C 494 may be used when required to improve workability of concrete. Amount and type of admixture subject to approval by Engineer.
- H. Reinforcing Steel:
- 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.
 - Cold bend reinforcing steel to shapes shown. Once steel has been bent, it may not be rebent.
 - 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.

~~I. Fibrous Reinforcing: Conform to requirements of Section 03240 - Fibrous Reinforcing.~~

2.02 EQUIPMENT

- A. Conform Equipment to requirements of ASTM C 94.

2.03 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. Slump of concrete shall be at least 2 inches but no more than 4 inches, when tested in accordance with ASTM C 143.

1. Concrete pavement, including curb, curb and gutter, and saw-tooth curb, shall contain at least 52 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 42 percent plus or minus 12 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: Less than or equal to 5 gallons per sack. Changes in water-cement ratio and mix design including increase in cement factor when necessary, will be made when 72-hour flexural strength does not meet minimum value of 500 psi.
4. Other requirements for proportioning, mixing, execution, testing, etc., shall be in accordance with this Section 02751 - Concrete Paving.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted base is ready to support imposed loads and meets compaction requirements.
- B. Verify lines and grades are correct.

3.02 PREPARATION

- A. Properly prepare, shape and compact each section of sub grade before placing forms, reinforcing steel or concrete. After forms have been set to proper grade and alignment, use sub grade planer to shape sub grade to its final cross section. Check contour of sub grade with template.
- B. Remove sub grade that will not support loaded form. Replace and compact sub grade to required density.

3.03 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 sub grade and for finishing and compacting concrete in good working order.
- B. Sub grade Planer and Template:
1. Use sub grade planer with adjustable cutting blades to trim sub grade 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 c inch. Tractors used to pull planer shall not produce ruts or indentations in sub grade. When slip form method of paving is used, operate sub grade 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 sub grade. 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 c 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 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 sub grade, 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 transangular 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.

3.04 FORMS

- A. Side Forms: Use metal forms of approved shape and section. Preferred depth of form 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 Engineer. 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 sub grade. 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 1/4 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 Engineer.
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.

3.05 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 centerline 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 3 inch.

3.06 FIBROUS REINFORCING

- A. Do not use fibrous reinforcing to replace structural, load-bearing, or moment-reinforcing steel.
- ~~B. Mix and place in accordance with requirements of Section 03240.~~

3.07 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 4 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.

3.08 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.

3.09 FINISHING

- A. Finish concrete pavement with power-driven transverse finishing machines or by hand finishing methods.
 - 1. Use transverse finishing machine to make at least two trips over each area. Make last trip continuous run of not less than 40 feet. After transverse screeding, use hand-operated longitudinal float to test and level surface to required grade.
 - 2. 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 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 JOINTS AND JOINT SEALING

- A. Conform to requirements of Section 02752 - Concrete Pavement Joints.

3.11 CONCRETE CURING

- A. Conform to requirements of Section 02753 - Concrete Pavement Curing.

3.12 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 c inch. Grind spots in excess of required tolerances to meet surface test requirements. Restore texture by grooving concrete to meet surface finishing specifications.

3.13 FIELD QUALITY CONTROL

- ~~A. Perform testing under provisions of Section 01454 - Testing Laboratory Services.~~
- B. 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. 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 at 7 days and 3500 pounds per square inch at 28 days.
- C. 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.
- D. 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 minimum of 3000 pounds per square inch.
- E. Request, at option, three additional cores in vicinity of cores indicating nonconforming in-place depths at no cost to City. In-place depth at these locations shall be average depth of four cores.
- F. Fill cores and density test sections with new concrete paving or non-shrink grout.

3.14 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.

3.15 UNIT PRICE ADJUSTMENT

- A. Unit price adjustments shall be made for in-place depth determined by cores as follows:
 - 1. Adjusted Unit Price shall be ratio of average thickness as determined by cores to thickness bid upon, times unit price.
 - 2. Apply adjustment to lower limit of 95 percent and upper limit of 100 percent of unit price.
 - 3. Average depth below 95 percent but greater than 90 percent may be accepted by Engineer at adjusted Unit Price of :

$$\text{Unit Price Bid} - [2 \times (1 - \text{ratio}) \times \text{Unit Price Bid}]$$

- 4. Average depth below 90 percent will be rejected by Engineer.

3.16 PAVEMENT MARKINGS

- A. Restore pavement markings to match those existing in accordance with standard specifications and details and Engineer's requirements.

3.17 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 beam once 7 day specified flexural 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 Engineer.
- 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

Section 02752

CONCRETE PAVEMENT JOINTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Joints for concrete paving; concrete sidewalks; concrete driveways, curbs, and curb and gutters.
- B. Saw-cutting existing concrete or asphalt pavements for new joints.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment for saw-cutting existing concrete or asphalt pavement for new joints is on linear foot basis. Saw-cutting existing standard concrete curb will be measured as 1-1/2 linear feet and existing standard concrete curb and gutter will be measured as 3 linear feet.~~
- ~~2. No separate payment will be made for expansion joints, formed or sawed street pavement contraction joints and longitudinal weakened plane joints. Include payment in unit price for Concrete Paving.~~
- ~~3. No separate payment will be made for joints for Curb, Curb and Gutter, Saw tooth Curb, Concrete Sidewalks, and Concrete Driveways. Include payment in unit price for Curb and Gutter, Concrete Sidewalks, and Concrete Driveways.~~
- ~~4. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- B. ASTM D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- C. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- D. ASTM D 3405 - Standard Specification for Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements.

1.04 SUBMITTALS

- ~~A. Submit product data and samples in accordance with requirements of Section 01330 - Submittal Procedures.~~
- B. Submit product data for joint sealing compound and proposed sealing equipment for approval.

- C. Submit samples of dowel cup, metal supports, and deformed metal strip for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Board Expansion Joint Material: Filler board of selected stock. Use wood of density and type as follows:
 - 1. Clear, all-heart cypress weighing no more than 40 pounds per cubic foot, after being oven dried to constant weight.
 - 2. Clear, all-heart redwood weighing no more than 30 pounds per cubic foot, after being oven dried to constant weight.
- B. Preformed Expansion Joint Material: Bituminous fiber and bituminous mastic composition material conforming to ASTM D 994 and ASTM D 1751.
- C. Joint Sealing Compound: Hot-poured rubber-asphalt compound conforming to ASTM D 3405.
- D. Load Transmission Devices:
 - 1. Smooth, steel dowel bars conforming to ASTM A 615, Grade 60. When indicated on Drawings, encase one end of dowel bar in approved cap having inside diameter 1/16 inch greater than diameter of dowel bar.
 - 2. Deformed steel tie bars conforming to ASTM A 615, Grade 60.
- E. Metal Supports for Reinforcing Steel and Joint Assembly: Employ metal supports of approved shape and size that will secure reinforcing steel and joint assembly in correct position during placing and finishing of concrete.

PART 3 EXECUTION

3.01 PLACEMENT

- A. When new work is adjacent to existing concrete, place joints at same location as existing joints in adjacent pavement.
- B. If the limit of removal of existing concrete or asphaltic pavement does not fall on existing joint, saw cut existing pavement minimum of 2 inches deep to provide straight, smooth joint surface without chipping, spalling or cracks.

3.02 CONSTRUCTION JOINTS

- A. Place transverse construction joint wherever concrete placement must be stopped for more than 30 minutes. Place longitudinal construction joints at interior edges of pavement lanes using No. 6 deformed tie bars, 30 inches long and spaced 18 inches on centers.

3.03 EXPANSION JOINTS

- A. Place 3/4-inch expansion joints at radius points of curb returns for cross street intersections, or as located in adjacent pavement but no further than 80 feet apart. Use no boards shorter than 6 feet. When pavement is 24 feet or narrower, use not more than 2 lengths of board. Secure pieces to form straight joint. Shape board filler accurately to cross section of concrete slab. Use load transmission

devices of type and size shown on Drawings unless otherwise specified or shown as "No Load Transfer Device". Seal with joint sealing compound.

3.04 CONTRACTION JOINTS

- A. Place contraction joints at same locations as in adjacent pavement or at spaces indicated on Drawings. Place smoothed, painted and oiled dowels accurately and normal to joint. Seal groove with joint sealing compound.

3.05 LONGITUDINAL WEAKENED PLANE JOINTS

- A. Place longitudinal weakened plane joints at spaces indicated on Drawings. Seal groove with joint sealing compound.

3.06 SAWED JOINTS

- A. Use sawed joints as an alternate to contraction and weakened plane joints. Circular cutter shall be capable of cutting straight line groove minimum of 1/2 inch wide. Depth shall be one quarter of pavement thickness plus 1/2 inch. Commence sawing as soon as concrete has hardened sufficiently to permit cutting without chipping, spalling or tearing and prior to initiation of cracks. Once sawing has commenced, it shall be continued until completed. Make saw cut with one pass. Complete sawing within 24 hours of concrete placement. Saw joints at required spacing consecutively in sequence of concrete placement.
- B. Concrete Saw: Provide sawing equipment adequate in power to complete sawing to required dimensions and within required time. Provide at least one standby saw in good working order. Maintain an ample supply of saw blades at work site at all times during sawing operations. Sawing equipment shall be on job at all times during concrete placement.

3.07 JOINTS FOR CURB, CURB AND GUTTER

- A. Place 3/4-inch preformed expansion joints through curb and gutters at locations of expansion and contraction joints in pavement; at end of radius returns at street intersections and driveways; and at curb inlets. Maximum spacing shall be 120-foot centers.

3.08 JOINTS FOR CONCRETE SIDEWALKS

- A. Provide 3/4-inch expansion joints conforming to ASTM A 1751 along and across sidewalk at back of curbs, at intersections with driveways, steps, and walls; and across walk at intervals not to exceed 36 feet. Provide expansion joint material conforming to ASTM D 994 for small radius curves and around fire hydrants and utility poles. Extend the expansion joint material full depth of the slab.

3.09 JOINTS FOR CONCRETE DRIVEWAYS

- A. Provide 3/4-inch expansion joints conforming to ASTM D 1751 across driveway in line with street face of sidewalks, at existing concrete driveways, and along intersections with sidewalks and other structures. Extend expansion joint material full depth of slab.

3.10 JOINT SEALING

- A. Seal joints only when surface and joints are dry, ambient temperature is above 50 degrees F and less than 85 degrees F, and weather is not foggy or rainy.
- B. Joint sealing equipment shall be in like new working condition throughout the joint sealing operation, and be approved by Resident Project Representative. Use concrete grooving machine or power-

operated wire brush and other equipment such as plow, brooms, brushes, blowers or hydro or abrasive cleaning as required to produce satisfactory joints.

- C. Clean joints of loose scale, dirt, dust and curing compound. The term joint includes wide joint spaces, expansion joints, dummy groove joints or cracks, either preformed or natural. Remove loose material from concrete surfaces adjacent to joints.
- D. Fill joints neatly with joint sealer to depth shown. Pour sufficient joint sealer into joints so that, upon completion, surface of sealer within joint will be 1/4 inch above level of adjacent surface or at elevation as directed.

3.11 PROTECTION

- A. Maintain joints in good condition until completion of Work.
- B. Replace damaged joints material with new material as required by this Section.

END OF SECTION

Section 02753

CONCRETE PAVEMENT CURING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Curing of Portland cement concrete paving.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. No separate payment will be made for concrete curing under this Section. Include payment in unit price for Concrete Paving, Concrete Sidewalks, Curbs, and Curb and Gutters.~~
- ~~2. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 171 - Standard Specifications for Sheet Materials for Curing Concrete.
- B. ASTM C 309 - Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete.

1.04 SUBMITTALS

~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~

- B. Submit manufacturer's product data for cover materials and liquid membrane-forming compounds.

PART 2 PRODUCTS

2.01 COVER MATERIALS FOR CURING

- A. Curing materials shall conform to one of the following:
 - 1. Polyethylene Film: Opaque pigmented white film conforming to requirements of ASTM C 171.
 - 2. Waterproofed Paper: Paper conforming to requirements of ASTM C 171.
 - 3. Cotton Mats: Single layer of cotton filler completely enclosed in cover of cotton cloth. Mats shall contain not less than 3/4 of a pound of uniformly distributed cotton filler per square yard of mat. Cotton cloth used for covering materials shall weigh not less than 6 ounces per square yard. Mats shall be stitched so that mat will contact surface of pavement at all points when saturated with water.

2.02 LIQUID MEMBRANE-FORMING COMPOUNDS

- A. Liquid membrane-forming compounds shall conform to ASTM C 309. Membrane shall restrict loss of water to not more than 0.55 kg/m² of surface in 72 hours.

PART 3 EXECUTION

3.01 CURING REQUIREMENT

- A. Concrete pavement shall be cured by protecting it against loss of moisture for period of not less than 72 hours immediately upon completion of finishing operations. Do not use membrane curing for concrete pavement to be overlaid by asphaltic concrete.
- B. Failure to provide sufficient cover material shall be cause for immediate suspension of concreting operations.

3.02 POLYETHYLENE FILM CURING

- A. Immediately after finishing surface, and after concrete has taken its initial set, apply water in the form of a fine spray. Cover surface with polyethylene film so film will remain in direct contact with surface during specified curing period.
- B. Cover entire surface and both edges of pavement slab. Joints in film sheets shall overlap minimum of 12 inches. Immediately repair tears or holes occurring during curing period by placing acceptable moisture-proof patches or by replacing.

3.03 WATERPROOFED PAPER CURING

- A. Immediately after finishing surface, and after concrete has taken its initial set, apply water in form of fine spray. Cover surface with waterproofed paper so paper will remain in direct contact with surface during specified curing period.
- B. Prepare waterproofed paper to form blankets of sufficient width to cover entire surface and both edges of pavement slab, and not be more than 60 feet in length. Joints in blankets caused by joining paper sheets shall lap not less than 5 inches and shall be securely sealed with asphalt cement having melting point of approximately 180 degrees F. Place blankets to secure an overlap of at least 12 inches. Tears or holes appearing in paper during curing period shall be immediately repaired by cementing patches over defects.

3.04 COTTON MAT CURING

- A. Immediately after finishing surface, and after concrete has taken its initial set, completely cover surface with cotton mats, thoroughly saturated before application, in such manner that they will contact surface of pavement equally at all points.
- B. Mats shall remain on pavement for specified curing period. Keep mats saturated so that, when lightly compressed, water will drip freely from them. Keep banked earth or cotton mat covering edges saturated.

3.05 LIQUID MEMBRANE-FORMING COMPOUNDS

- A. Immediately after finishing surface, and after concrete has taken its initial set, apply liquid membrane-forming compound in accordance with manufacturer's instructions.

END OF SECTION

Section 02771

CURB, CURB AND GUTTER, AND HEADERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforced concrete curb, reinforced monolithic concrete curb and gutter, and mountable curb.
- B. Paving headers and railroad headers poured monolithically with concrete base or pavement.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment for curbs and for curbs and gutter is on linear foot basis measured along face of curb.~~
- ~~2. Payment for headers is on linear foot basis measured between lips of gutters adjacent to concrete base and measured between backs of curbs adjacent to streets.~~
- ~~3. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 SUBMITTALS

~~A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.~~

- B. Submit details of proposed formwork for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete: Conform to material and proportion requirements for concrete of Section 02751 - Concrete Pavement.
- B. Reinforcing Steel: Conform to material requirements for welded wire fabric of Section 02751 - Concrete Pavement.
- C. Grout: Nonmetallic, nonshrink grout containing no chloride producing agents conforming to the following requirements.
 - 1. Compressive strength
 - a. at 7 days: 3500 psi
 - b. at 28 days: 8000 psi
 - 2. Initial set time: 45 minutes
 - 3. Final set time: 1.5 hours

- D. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02752 - Concrete Pavement Joints.
- E. Expansion Joint Filler: Conform to material requirements for expansion joint filler of Section 02752 - Concrete Pavement Joints.
- F. Mortar: Mortar finish composed of one part Portland cement and 1-1/2 parts of fine aggregate. Use only when approved by Resident Project Representative.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare subgrade in accordance with applicable portions of sections on excavation and fill, embankment, and subgrade and roadbed.

3.02 PLACEMENT

- A. Guideline: Set to follow top line of curb. Attach indicator to provide constant comparison between top of curb and guideline. Ensure flow lines for monolithic curb and gutters conform to slopes indicated on Drawings.
- B. Forms: Brace to maintain position during pour. Use metal templates cut to section shown on Drawings.
- C. Reinforcement: Secure in position so that steel will remain in place throughout placement. Reinforcing steel shall remain at approximate center of base or pavement as indicated on Drawings.
- D. Joints: Place in accordance with Section 02752 - Concrete Pavement Joints. Place dummy groove joints at 6-foot centers at right angles to curb lines. Cut dummy grooves 1/4 inch deep using an approved edging tool.
- E. Place concrete in forms to required depth. Consolidate thoroughly. Do not permit rock pockets in form. Entirely cover top surfaces with mortar.

3.03 MANUAL FINISHING

- A. After concrete is in place, remove front curb forms. Form exposed portions of curb, and of curb and gutter, using mule which conforms to curb shape, as shown on Drawings.
- B. Thin coat of mortar may be worked into exposed face of curb using mule and two-handled wooden darby at least 3 feet long.
- C. Before applying final finish move 10-foot straightedge across gutter and up curb to back form of curb. Repeat until curb and gutter are true to grade and section. Lap straightedge every 5 feet.
- D. Steel trowel finish surfaces to smooth, even finish. Make face of finished curb true and straight.
- E. Edge outer edge of gutter with 1/4-inch edger. Finish edges with tool having 1/4-inch radius.
- F. Finish visible surfaces and edges of finished curb and gutter free from blemishes, form marks and tool marks. Finished curb or curb and gutter shall have uniform color, shape and appearance.

3.04 MECHANICAL FINISHING

- A. Mechanical curb forming and finishing machines may be used instead of, or in conjunction with, previously described methods. Use of mechanical methods shall provide specified curb design and finish.

3.05 CURING

- A. Immediately after finishing operations, cure exposed surfaces of curbs and gutters in accordance with Section 02753 - Concrete Pavement Curing.

3.06 TOLERANCES

- A. Top surfaces of curb and gutter shall have uniform width and shall be free from humps, sags or other irregularities. Surfaces of curb top, curb face and gutter shall not vary more than 1/8 inch from edge of straightedge laid along them.

3.07 PROTECTION

- A. Maintain curbs and gutters in good condition until completion of the Work.
- B. Replace damaged curbs and gutters to comply with this Section.

END OF SECTION

Section 02775

CONCRETE SIDEWALKS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforced concrete sidewalks.
- B. Wheelchair Ramps.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices.~~

- ~~1. Payment for concrete sidewalks is on square foot basis.~~
- ~~2. Payment for wheelchair ramps of each type specified is on a per ramp basis. The removal of existing sidewalk and curb or curb and gutter is included in the cost of the ramp.~~
- ~~3. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- B. ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- C. ASTM C 42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- D. ASTM C 138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- E. ASTM C 143 - Test Method for Slump of Hydraulic Cement Concrete.
- F. ASTM C 172 - Practice for Sampling Freshly Mixed Concrete.
- G. ASTM D 698 - Standard Test Methods for Moisture - Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-Pound Rammer and 12-inch Drop.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Submittal Procedures Section of this Project Manual.
- B. Submit certified testing results and certificates of compliance.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Concrete: Conform to material and proportion requirements for concrete paving.

- B. Reinforcing Steel: Conform to material requirements for welded wire fabric of Section 02751 - Concrete Paving.
- C. Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 02752 - Concrete Pavement Joints.
- D. Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 02752 - Concrete Pavement Joints.
- E. Forms: Use straight, unwarped wood or metal forms with nominal depth equal to or greater than the proposed sidewalk thickness. The use of 2" by 4" lumber as forms will not be allowed.
- F. Sand Bed: Conform to material requirements for bank run sand of Section 02320 - Utility Backfill Materials.
- G. Sodding: Conform to material requirements for sodding of Section 02922 - Sodding.

PART 3 EXECUTION

3.01 REPLACEMENT

- A. Replace sidewalks which are removed or damaged during construction with sidewalk of thickness and width equivalent to those removed or damaged.
- B. Provide replaced and new sidewalks with wheelchair ramps if sidewalk intersects curb at street or driveway.

3.02 PREPARATION

- A. Identify and protect utilities which are to remain.
- B. Protect living trees, other plant growth, and features designated to remain.
- C. Conduct clearing and grubbing operations in accordance with Section 02233 - Clearing and Grubbing.
- D. Excavate subgrade to the line, grade, and cross section shown on Drawings. Remove soft spots and pumping soils and replace with select fill material in accordance with the applicable portions of Item 02317 - Excavation and Backfill for Utilities.
- E. Immediately after subgrade is prepared, cover with compacted sand bed to depth as shown on Drawings. Pour concrete when sand is moist but not saturated.

3.03 PLACEMENT

- A. Setting Forms: Securely stake forms to line and grade. Maintain position during concrete placement.
- B. Reinforcement: Install 6x6, W2.9 x W2.9 welded wire fabric or No. 3 reinforcing steel bars on 18-inch centers longitudinally and transversely. Lay longitudinal bars in walk continuously, except through expansion joints. Support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
- C. Expansion Joints: Install expansion joints in accordance with Section 02752 - Concrete Pavement Joints.

- ~~D. Colored Concrete: Apply coloring agent in accordance with Section 02761 - Colored Concrete for Medians and Sidewalks if called for on the Drawings.~~
- E. Place concrete in forms to specified depth and consolidate with immersion type vibrator or manual tamping device. Manual tamping devices shall only be used with approval of the Resident Project Representative. Bring mortar to surface.
- F. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush.
- G. Unless otherwise indicated on Drawings, mark off joints 1/8 inch deep, at spacing equal to width of walk. Use joint tool equal in width to edging tool.
- H. Finish edges with tool having 1/4-inch radius.
- I. After concrete has set sufficiently, refill space along sides of sidewalk to top of walk with suitable material. Tamp until firm and solid. Dispose of excess material in accordance with Waste Material Disposal. Repair driveways and parking lots damaged by sidewalk excavation.

3.04 CURING

- A. Conform to requirements of concrete pavement curing.

3.05 FIELD QUALITY CONTROL

- A. Testing will be performed under provisions of the testing laboratory services.
- B. Compressive Strength Test Specimens: Four test specimens for compressive strength test will be made in accordance with ASTM C 31 for each 30 cubic yards or less of sidewalk that is placed in one day. Two specimens will be tested at 7 days. The remaining two specimens will be tested at 28 days. Specimens will be tested in accordance with ASTM C 39.
- C. Yield test for cement content per cubic yard of concrete will be made in accordance with ASTM C 138. If such cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.
- D. If the Contractor places concrete without notifying the laboratory, the Owner will have the concrete tested by means of a core test as specified in ASTM C 42. If the concrete does not meet the specification, the cost of the test will be deducted from payment due the Contractor.
- E. Sampling of fresh concrete shall be in accordance with ASTM C 172.
- F. Take slump tests when cylinders are made and when concrete slump appears excessive.
- G. If any 28-day laboratory test indicates that concrete of low strength has been placed, the concrete in question shall be tested by taking cores as directed by the Resident Project Representative. At least three representative cores shall be taken and tested as specified in ASTM C 42 and the cost deducted from payment due the Contractor.

3.06 NONCONFORMING PAVEMENT

- A. Remove and replace areas of sidewalk that fail compressive strength tests, with concrete of thickness shown on Drawings.
- B. Nonconforming sidewalk sections shall be replaced at no additional cost to the Owner.

3.07 PROTECTION

- A. Maintain sidewalks in good condition until completion of the Work.
- B. Replace damaged sidewalks in accordance with Paragraph 3.01, Replacement.

END OF SECTION

SECTION 02920

TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL**1.1 SECTION INCLUDES**

- A. Furnish all labor, materials, tools, equipment, and services for all topsoiling and finished grading, as indicated, in accord with provisions of contract documents.
- B. Completely coordinate with work of all other trades.
- C. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.2 LOCATION OF WORK

- A. All areas within limits of construction, areas of surplus material disposal, and all areas which are disturbed in the course of the work.

1.3 RELATED SECTIONS

- A. Section 02200 - Earthwork and Site Grading
- B. Section 02233 - Clearing and Grubbing

1.4 QUALITY ASSURANCE

- A. Finish Grading Tolerance:
 - 1. 0.1 ft. (30 mm) plus/minus from required elevations.

1.5 JOB CONDITIONS:

- A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Topsoil:
 - 1. Original fertile, friable surface soil typical of the area, capable of supporting native plant growth, reasonably free of subsoil, clay, weeds, roots, and stones larger than 1 inch.
 - a. Use existing topsoil stockpiled under Section 02100.
 - b. If amount of topsoil stockpiled is less than amount necessary for the work, furnish all additional topsoil required at no additional cost to the Owner.
 - c. Contractor may import topsoil to the site with prior review and approval by the Owner's Representative.
- B. Surplus Material:
 - 1. Legally dispose of surplus material offsite.

PART 3 - EXECUTION**3.1 ROUGH GRADE REVIEW**

- A. Rough grading shall be inspected and approved by owner's representative before site work proceeds.

3.2 PREPARATION

- A. Correct, adjust and/or repair rough graded areas.
 - 1. Cut off mounds and ridges.
 - 2. Fill gullies and depressions.
 - 3. Perform other necessary repairs.
 - 4. Bring all sub-grades to specified contours, even and properly compacted.
- B. Remove all stones and debris over 2 in. (50 mm) in any dimension.

3.3 PLACING TOPSOIL

- A. Do not place topsoil when subgrade is either wet or frozen enough to cause clodding.
- B. Spread topsoil to minimum compacted depth of 6 in. (100 mm) for all disturbed earth areas.
- C. Make finished surface free of stones, sticks, dirt clods or other material 1 in. (25 mm) or more in any dimension.
- D. Drag finish with harrow (or hand rake) to insure smooth finish to the lines and grades indicated.
- E. Restore areas occupied by stockpiles to condition of rest of finished work.

3.4 ACCEPTANCE

- A. Upon completion of topsoiling, obtain owner's representative acceptance of grade and surface.

END OF SECTION

Section 02921

HYDRO MULCH SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Seeding, fertilizing, mulching, and maintenance of areas indicated on Drawings.

1.02 MEASUREMENT AND PAYMENT

~~A. Unit Prices:~~

- ~~1. Payment for hydro mulch seeding is on an acre basis.~~
- ~~2. Refer to Section 01270 – Measurement and Payment for unit price procedures.~~

- B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.03 SUBMITTALS

~~A. Conform to requirements of Section 01330 – Submittal Procedures.~~

- B. Submit certification from supplier that each type of seed conforms to these specifications and requirements of Texas Seed Law. Certification shall accompany seed delivery.

- C. Submit certificate stating that fertilizer complies with these specifications and requirements of Texas Fertilizer Law.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Topsoil: Conform to material requirements of Section 02920 – Topsoil and Finished Grading.

- B. Seed: Conform to U.S. Department of Agriculture rules and regulations of Federal Seed Act and Texas Seed Law. Seed shall be certified 90 percent pure and furnish 80 percent germination and meet following requirements:

- 1. Rye: Fresh, clean, Italian rye grass seed (*Lolium multi-florum*), mixed in labeled proportions. As tested, minimum percentages of impurities and germination must be labeled. Deliver in original unopened containers.
- 2. Bermuda: Extra-fancy, treated, lawn type common bermuda (*Cynodon dactylon*). Deliver in original, unopened container showing weight, analysis, name of vendor, and germination test results.
- 3. Wet, moldy, or otherwise damaged seed will not be accepted.

4. Seed requirements, application rates, and planting dates are:

TYPE	APPLICATION RATE POUNDS/A	PLANTING DATE
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88	40 40	Jan 1 to Mar 31
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88 Annual Rye Grass (Gulf)	40 40 30	Oct 1 to Dec 31

C. Fertilizer: Dry and free flowing, inorganic, water-soluble commercial fertilizer, which is uniform in composition. Deliver in unopened containers, which bear manufacturers guaranteed analysis. Caked, damaged, or otherwise unsuitable fertilizer will not be accepted. Fertilizer shall contain minimum percentages of following elements:

1. Nitrogen: 10 Percent
2. Phosphoric Acid: 20 Percent
3. Potash: 10 Percent

D. Mulch:

1. Virgin wood cellulose fibers from whole wood chips having minimum of 20 percent fibers 0.42 inches in length and 0.01 inches in diameter.
2. Cellulose fibers manufactured from recycled newspaper and meeting same fiber content and size as for cellulose fibers from wood chips.
3. Dye mulch green for coverage verification purposes.

E. Soil Stabilizer: "Terra Tack 1" or approved equal.

F. Weed control agent: Pre-emergent herbicide for grass areas, such as "Benefin," or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

A. Place and compact topsoil in accordance with requirements of Section 02920 – Topsoil and Finished Grading.

B. Dispose of Objectionable and Waste Materials in accordance with Section 02233 – Clearing and Grubbing.

3.02 APPLICATION

- A. Seed: Apply uniformly at rates given in Paragraph 2.01 B for type of seed and planting date.
- B. Fertilizer: Apply uniformly at rate of 500 pounds per acre.
- C. Mulch: Apply uniformly at rate of 50 pounds per 1000 square feet.
- D. Soil Stabilizer: Apply uniformly at rate of 40 pounds per acre.
- E. Weed Control Agent: Apply at manufacturer's recommended rate prior to hydro mulching.
- F. Sod: Lay single row of sod along perimeter where topsoil and pavement intersect.
- G. Suspend operations under conditions of drought, excessive moisture, high winds, or extreme or prolonged cold. Obtain Engineer approval before resuming operations.

3.03 MAINTENANCE

- A. Maintain grassed areas minimum of 90 days, or as required to establish an acceptable lawn. For areas seeded in fall, continue maintenance following spring until acceptable lawn is established.
- B. Maintain grassed areas by watering, fertilizing, weeding, and trimming.
- C. Repair areas damaged by erosion by regrading, rolling and replanting.
- D. Reseed small, sparse grass areas. When sparse areas exceed 20 percent of planted area, reseed by hydro mulch.
- E. Mow grass when height reaches 32 inches or greater on average before final acceptance. Mow to height of 22 inches.

END OF SECTION

TABLE OF CONTENTS

DIVISION 2 - SITE CONSTRUCTION

02055	Soils for Earthwork.....	1-2
02230	Site Clearing.....	1-2
02311	Rough Grading.....	1-2
02315	Excavation and Fill.....	1-2
02362	Termite Control.....	1-3

DIVISION 3 - CONCRETE

03100	Concrete Forms and Accessories.....	1-7
03200	Concrete Reinforcement.....	1-6
03300	Cast-In-Place Concrete.....	1-10
03350	Concrete Finishing.....	1-3
03390	Concrete Curing.....	1-2
03600	Grout.....	1-4

DIVISION 4- MASONRY

04065	Masonry Mortar and Grout.....	1-3
04820	Reinforced Unit Masonry Assemblies.....	1-7

DIVISION 5- METALS

05120	Structural Steel.....	1-8
05210	Steel Joist.....	1-4
05312	Steel Roof Deck.....	1-3

DIVISION 6 - WOOD

06112	Rough Carpentry.....	1-5
06150	Wood Decking.....	1-2
06173	Wood Truss.....	1-4

END OF SECTION



SECTION 03100

CONCRETE FORMS AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Architectural form liners.
 - 4. Form accessories.
 - 5. Form stripping.
- B. Related Sections:
 - 1. Section 03200 - Concrete Reinforcement.
 - 2. Section 03300 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
 - 1. AF&PA - National Design Specifications for Wood Construction.
- C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
- D. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
- E. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.

1.3 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.4 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm perms when tested in accordance with ASTM E96, Procedure A.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347 ACI 301 ACI 318.
- B. For wood products furnished for work of this Section, comply with AF&PA.
- C. Perform Work in accordance with State Municipality of Highways Public Work's standard.

1.6 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.

2.2 FORMWORK ACCESSORIES

- A. Vapor Retarder: Where indicated on Drawings, 10 mil thick polyethylene sheet manufacture by:
 - 1. Stego Wrap Class A: by Stego Industries LLC (887) 464-7834
 - 2. Griffolyn by Reef Industries (800) 231-6074
 - 3. VaporBlock 10 by Raven Industries (800) 635-3456
 - 4. Perminator Vapor – May by W.R. Meadows (800) 342-5976
 - 5. Or Equivalent
- B. Bituminous Joint Filler: ASTM D1751.

- C. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.
- D. Water Stops: Rubber Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, inch wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

***** OR *****

- E. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in concrete construction.
 - 1. Colloid Environmental Technologies Company Model.
 - 2. TC MiraDRi Model.
 - 3. Paramount Technical Products Model.
 - 4. Substitutions: Section 01600 - Product Requirements Not Permitted.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Earth forms are not permitted.
- B. Formwork - General:
 - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
 - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.

- C. Forms for Smooth Finish Concrete:
 - 1. Use steel, plywood or lined board forms.
 - 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 - 3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 - 4. Use full size sheets of form lines and plywood wherever possible.
 - 5. Tape joints to prevent protrusions in concrete.
 - 6. Use care in forming and stripping wood forms to protect corners and edges.
 - 7. Level and continue horizontal joints.
 - 8. Keep wood forms wet until stripped.
- D. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 ACI 318.
- E. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- F. Obtain Architect/Engineer's approval before framing openings in structural members not indicated on Drawings.
- G. Install fillet and chamfer strips on external corners of beams joists columns and.
- H. Install void forms in accordance with manufacturer's recommendations.
 - 1. SureVoid Products, Inc., Englewood, CO (800) 458-5444.
- I. Do not reuse wood formwork more than times for concrete surfaces to be exposed to view. Do not patch formwork.

3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- G. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.
 - 2. Place ties at least 1 inch away from finished surface of concrete.
 - 3. Leave inner rods in concrete when forms are stripped.
 - 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.
- H. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- I. Construction Joints:
 - 1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 - 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 - 3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.
 - 4. Arrange joints in continuous line straight, true and sharp.
- J. Openings for Items Passing Through Concrete:
 - 1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 - 2. Coordinate work to avoid cutting and patching of concrete after placement.
 - 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- K. Screeds:

1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 2. Slope slabs to drain where required or as shown on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- L. Screed Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
 2. Staking through membrane is not be permitted.
- M. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 ACI 318.

***** OR *****

- B. Camber slabs and beams 1/4 inch per 10 feet in accordance with ACI 301 ACI 318.

3.8 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.
- B. Related Sections:
 - 1. Section 03100 - Concrete Forms and Accessories.
 - 2. Section 03300 - Cast-in-Place Concrete.
 - 3. Section 03350 - Concrete Finishing: Reinforcement for concrete floor toppings.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 530.1 - Specifications for Masonry Structures.
 - 4. ACI SP-66 - ACI Detailing Manual.
- B. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - 4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
 - 5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 6. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
 - 7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 8. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 9. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

10. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
11. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
12. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
13. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.

C. American Welding Society:

1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute:

1. CRSI - Manual of Standard Practice.
2. CRSI - Placing Reinforcing Bars.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices and.
- C. Certificates: Submit AWS qualification certificate for welders employed on the Work.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
 1. Submit certified copies of mill test report of reinforcement materials analysis.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301 ACI 318.
- B. Prepare shop drawings in accordance with ACI SP-66.
- C. Perform Work in accordance with State Municipality of Highways Public Work's standard.

1.5 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months.

1.6 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Deformed and Plain Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished galvanized finish epoxy coated finish.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type, epoxy coated.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel Plastic tipped steel Stainless steel type; size and shape to meet Project conditions.
- D. Reinforcing Splicing Devices: Exothermic welding type; full tension and compression; sized to fit joined reinforcing.

***** OR *****

- E. Reinforcing Splicing Devices: Mechanical set screw swaged threaded type; full tension and compression; sized to fit joined reinforcing.
- F. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice ACI 318 applicable code.
- B. Form standard hooks for 180 degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318 applicable code.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form spiral column reinforcement from minimum 3/8 inch diameter continuous plain deformed bar or wire.

- F. Form ties and stirrups from the following:
 - 1. For bars No. 10 and Smaller: No. 3 deformed bars deformed wire.
 - 2. For bars No. 11 and Larger: No. 4 deformed bars deformed wire.
- G. Weld reinforcement in accordance with AWS D1.4.
- H. Galvanized Epoxy-Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI.
- I. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

2.4 SHOP FINISHING

- A. Galvanized Finish for Steel Bars: ASTM A767/A767M, Class I II, hot dip galvanized after fabrication.
- B. Epoxy Coated Finish for Steel Bars: ASTM A775/A775M ASTM A934/A934M.
- C. Epoxy Coated Finish for Steel Wire: ASTM A884/A884M; Class A using ASTM A775/A775M ASTM A934/A934M.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly except as permitted by Architect/Engineer.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318 of one bar diameter, but not less than 1 inch.
 - 1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.
- E. Maintain concrete cover around reinforcement in accordance with ACI 318 applicable code as follows:

Footings and Concrete Formed Against Earth	3 inches

Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Beams and Columns		1-1/2 inches
Shell and Folded Plate Members	No. 6 bars and larger	3/4 inches
	No. 5 bars and smaller	1/2 inches

3.2 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

- C. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

3.3 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318 applicable code.
- C. Perform field inspection and testing in accordance with ACI 318 applicable code.
- D. Provide free access to Work and cooperate with appointed firm.
- E. Reinforcement Inspection:
 - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Welding: Inspect welds in accordance with AWS D1.1.

3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M.
5. Continuous Weld Inspection: Inspect reinforcement as required by ACI 318 applicable code.
6. Periodic Weld Inspection: Other welded connections.

END OF SECTION

Section 03211

REINFORCING STEEL

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Structural concrete reinforcement and grouting of reinforcement dowel bars into hardened concrete.

~~1.02 UNIT PRICES~~

- ~~A. No separate payment will be made for reinforcing steel or grouting that is part of the Work as bid. Include payment in unit price for structural concrete.~~
- ~~B. Measurement for reinforcing steel installed as extra work is on a per pound basis.~~
- ~~C. Refer to Section 01270 - Measurement and Payment for unit price procedures.~~

1.03 REFERENCES

- A. ACI 315 - Details and Detailing of Concrete Reinforcement.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ASTM A 36 - Standard Specification for Structural Steel.
- D. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- E. ASTM A 185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
- F. ASTM A 497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
- G. ASTM A 615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- H. ASTM A 675 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
- I. ASTM A 775/A 775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- J. ASTM C 881 - Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- K. AWS D 1.4 - Structural Welding Code - Reinforcing Steel.
- L. WRI - Manual of Standard Practice for Welded Wire Fabric.
- M. CRSI MSP-1 - Manual of Standard Practice.

1.04 SUBMITTALS

- ~~A. Conform to Section 01330 - Submittal Procedures.~~

B. Shop Drawings:

1. Submit shop drawings detailing reinforcement fabrication, bar placement location, splices, spacing, bar designation, bar type, length, size, bending, number of bars, bar support type and other pertinent information, including dimensions. Provide sufficient detail for placement of reinforcement without use of Contract Drawings. Information shall correspond directly to data listed on bill of materials.
2. Use of reproductions of Contract Drawings by Contractor, Subcontractor, erector, fabricator or material supplier in preparation of shop drawings (or in lieu of preparation of shop drawings) signifies acceptance by that party of information shown thereon as correct, and acceptance of obligation to pay for any job expense, real or implied, arising due to errors that may occur thereon. Remove references to Design Engineer, including seals, when reproductions of Contract Drawings are used as shop drawings.
3. Detail shop drawings in accordance with ACI 315, Figure 6.
4. Submit shop drawings showing location of proposed additional construction joints as required under Section 03351 - Joints in Concrete Structures, and obtain approval of Engineer, prior to submitting reinforcing steel shop drawings.

C. Bill of Materials: Submit with shop drawings.

D. Product Data:

1. Mechanical Bar Splices: Submit manufacturer's technical literature, including specifications and installation instructions.
2. Epoxy grout proposed for anchoring reinforcing dowels to hardened concrete: Submit manufacturer's technical literature including recommended installation procedures.

E. Certificates:

1. Submit steel manufacturer's certificates of mill tests giving properties of steel proposed for use. List manufacturer's test number, heat number, chemical analysis, yield point, tensile strength and percentage of elongation. Identify proposed location of steel in work.
2. Foreign-manufactured reinforcing bars shall be tested for conformance to ASTM requirements by a certified independent testing laboratory located in United States. Certification from any other source is not acceptable. Submit test reports for review. Do not begin fabrication of reinforcement until material has been approved.

1.05 HANDLING AND STORAGE

- A. Store steel reinforcement above ground on platforms, skids or other supports. Protect reinforcing from mechanical injury, surface deterioration and formation of excessive, loose or flaky rust caused by exposure to weather. Protect epoxy-coated reinforcing from formation of any amount of rust.

1.06 QUALITY ASSURANCE

- A. Notify Resident Project Representative at least 48 hours before concrete placement so that reinforcement may be inspected, and errors corrected, without delaying Work.

PART 2 P R O D U C T S

2.01 MATERIAL

- A. Reinforcing Bars: Deformed bars conforming to ASTM A 615, grade as indicated on Drawings, except column spirals and those shown on Drawings to be smooth bars. Where grade is not shown on Drawings, use Grade 60.
- B. Smooth Bars: Where indicated on Drawings, use smooth bars conforming to ASTM A 36; ASTM A 615, Grade 60; or ASTM A 675, Grade 70.
- C. Column Spirals: Bars conforming to ASTM A 615, Grade 60, or wire conforming to ASTM A 82.
- D. Epoxy-Coated Deformed Bars, Column Spirals and Smooth Bars: Conform to ASTM A 775/A 775M.
- E. Welded Wire Fabric:
 - 1. Welded Smooth Wire Fabric: Conform to ASTM A 185.
 - 2. Welded Deformed Wire Fabric: Conform to ASTM A 497.
 - 3. Provide wire size, type and spacing as shown. Where type is not shown on Drawings, use welded smooth wire fabric.
 - 4. Furnish welded wire fabric in flat sheets only.
- F. Tie Wire: 16-1/2 gage or heavier annealed steel wire. Use plastic-coated tie wire with epoxy-coated reinforcing steel.
- G. Bar Supports: Provide chairs, riser bars, ties and other accessories made of plastic or metal, except as otherwise specified. Use bar supports and accessories of sizes required to provide required concrete cover. Where concrete surfaces are exposed to weather, water or wastewater, provide plastic accessories only; do not use galvanized or plastic-tipped metal in such locations. Provide metal bar supports and accessories rated Class 1 or 2 conforming to CRSI MSP-1 Manual of Standard Practice. Use epoxy-coated bar supports with epoxy-coated reinforcing bars.
- H. Slabs on Grade: Provide chairs with sheet metal bases or provide precast concrete bar supports 3 inches wide, 6 inches long, and thick enough to allow required cover. Embed tie wires in 3-inch by 6-inch side.
- I. Mechanical Bar Splices:
 - 1. Conform to ACI 318; use where indicated on Drawings.
 - a. Compression splices shall develop ultimate stress of reinforcing bar.
 - b. Tension splices shall develop 125 percent of minimum yield point stress of reinforcing bar.
 - 2. Regardless of chemical composition of steel, any heat effect shall not adversely affect performance of reinforcing bar.
- J. Welded Splices:

1. Provide welded splices where shown and where approved by the Engineer. Welded splices of reinforcing steel shall develop a tensile strength exceeding 125 percent of the yield strength of the reinforcing bars connected.
 2. Provide materials for welded splices conforming to AWS D1.4.
- K. Epoxy Grout: High-strength rigid epoxy adhesive, conforming to ASTM C 881, Type IV, manufactured for purpose of anchoring dowels into hardened concrete and the moisture condition, application temperature and orientation of the hole to be filled. Unless otherwise shown, depth of embedment shall be as required to develop the full tensile strength (125 percent of yield strength) of dowel, but not less than 12 diameters.

2.02 FABRICATION

- A. Bending: Fabricate bars to shapes indicated on Drawings by cold bending. Bends shall conform to minimum bend diameters specified in ACI 318. Do not straighten or rebend bars. Fabricate epoxy-coated reinforcing steel to required shapes in a manner that will not damage epoxy coating. Repair any damaged epoxy coating with patching material conforming to Item 4.4 of ASTM A 775/A 775M.
- B. Splices:
1. Locate splices as indicated on Drawings. Do not locate splices at other locations without approval of Engineer. Use minimum number of splices located at points of minimum stress. Stagger splices in adjacent bars.
 2. Length of lap splices: As shown on Drawings.
 3. Prepare ends of bars at mechanical splices in accordance with splice manufacturer's requirements.
- C. Construction Joints: Unless otherwise shown, continue reinforcing through construction joints.
- D. Bar Fabrication Tolerances: Conform to tolerances listed in ACI 315, Figures 4 and 5.
- E. Standard Hooks: Conform to the requirements of ACI 318.
- F. Marking: Clearly mark bars with waterproof tags showing number of bars, size, mark, length and yield strength. Mark steel with same designation as member in which it occurs.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean reinforcement of scale, loose or flaky rust and other foreign material, including oil, mud or coating that will reduce bond to concrete.

3.02 INSTALLATION

- A. Placement Tolerances: Place reinforcement within tolerances of Table 03210A at the end of this Section. Bend tie wire away from forms to maintain the specified concrete coverage.
- B. Interferences: Maintain 2-inch clearance from embedded items. Where reinforcing interferes with location of other reinforcing steel, conduit or embedded items, bars may be moved within

- specified tolerances or one bar diameter, whichever is greater. Where greater movement of bars is required to avoid interference, notify Engineer. Do not cut reinforcement to install inserts, conduit, mechanical openings or other items without approval of Engineer.
- C. Concrete Cover: Provide clear cover measured from reinforcement to face of concrete as listed in Table 03210B at the end of this Section, unless otherwise indicated on Drawings.
- D. Placement in Forms: Use spacers, chairs, wire ties and other accessory items necessary to assemble, space and support reinforcing properly. Provide accessories of sufficient number, size and strength to prevent deflection or displacement of reinforcement due to construction loads or concrete placement. Use appropriate accessories to position and support bolts, anchors and other embedded items. Tie reinforcing bars at each intersection, and to accessories. Blocking reinforcement with concrete or masonry is prohibited.
- E. Placement for Concrete on Ground: Support bar and wire reinforcement on chairs with sheet metal bases or precast concrete blocks spaced at approximately 3 feet on centers each way. Use minimum of one support for each 9 square feet. Tie supports to reinforcing bars and wires.
- F. Vertical Reinforcement in Columns: Offset vertical bars by at least one bar diameter at splices. Provide accurate templates for column dowels to ensure proper placement.
- G. Splices:
1. Do not splice bars, except at locations indicated on Drawings or reviewed shop drawings, without approval of Engineer.
 2. Lap Splices: Unless otherwise shown or noted, Class B, conforming to ACI 318-89, Section 12.15.1. Tie securely with wire prior to concrete placement, to prevent displacement of splices during concrete placement.
 3. Mechanical Bar Splices: Use only where indicated on Drawings or approved by the Engineer. Install in accordance with manufacturer's instructions.
 - a. Couplers located at a joint face shall be of a type which can be set either flush or recessed from the face as shown. Seal couplers prior to concrete placement to completely eliminate concrete or cement paste from entering.
 - b. Couplers intended for future connections: Recess 1/2 inch minimum from concrete surface. After concrete is placed, plug coupler and fill recess with sealant to prevent contact with water or other corrosive materials.
 - c. Unless noted otherwise, match mechanical coupler spacing and capacity to that shown for the adjacent reinforcing.
- H. Construction Joints: Place reinforcing continuous through construction joints, unless noted otherwise.
- I. Welded Wire Fabric: Install wire fabric in as long lengths as practicable. Unless otherwise indicated on Drawings, lap adjoining pieces at least 6 inches or one full mesh plus 2 inches, whichever is larger. Lace splices with wire. Do not make end laps midway between supporting beams, or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps. Conform to WRI - Manual of Standard Practice for Welded Wire Fabric.
- J. Field Bending: Shape reinforcing bent during construction operations to conform to Drawings.

Bars shall be cold-bent; do not heat bars. Closely inspect reinforcing for breaks. When reinforcing is damaged, replace, Cadweld, or otherwise repair, as directed by Engineer. Do not bend reinforcement after it is embedded in concrete.

- K. Epoxy-coated Reinforcing Steel: Install in accordance with Paragraph 3.02J, Field Bending, and in a manner that will not damage epoxy coating. Repair damaged epoxy coating with patching material as specified in Paragraph 2.02A, Bending.
- L. Field Cutting: Cut reinforcing bars by shearing or sawing. Do not cut bars with cutting torch.
- M. Welding of reinforcing bars is prohibited, except where shown on Drawings.

3.03 GROUTING OF REINFORCING AND DOWEL BARS

- A. Use epoxy grout for anchoring reinforcing and dowel steel to existing concrete in accordance with epoxy manufacturer's instructions. Drill hole not more than 1/4 inch larger than steel bar diameter (including height of deformations for deformed bars) in existing concrete. Just before installation of steel, blow hole clean of all debris using compressed air. Partially fill hole with epoxy, using enough epoxy so when steel bar is inserted, epoxy grout will completely fill hole around bar. Dip end of steel bar in epoxy and twist bar while inserting into partially-filled hole.

Table 03210A
REINFORCEMENT PLACEMENT TOLERANCES

PLACEMENT	TOLERANCE IN INCHES
Clear Distance - To formed soffit: To other formed surfaces: Minimum spacing between bars:	-1/4 "1/4 -1/4
Clear distance from unformed surface to top reinforcement - Members 8 inches deep or less: Members more than 8 inches deep but less than 24 inches deep: Members 24 inches deep or greater: Uniform spacing of bars (but the required number of bars shall not be reduced): Uniform spacing of stirrups and ties (but the required number of stirrups and ties shall not be reduced):	"1/4 -1/4, +1/2 -1/4, +1 "2 "1
Longitudinal locations of bends and ends of reinforcement - General: Discontinuous ends of members: Length of bar laps:	"2 "1/2 -1-1/2
Embedded length - For bar sizes No. 3 through 11: For bar sizes No. 14 and 18:	-1 -2

Table 03210B
MINIMUM CONCRETE COVER FOR REINFORCEMENT

SURFACE	MINIMUM COVER IN INCHES
Slabs and Joists - Top and bottom bars for dry conditions - No. 14 and No. 18 bars: No. 11 bars and smaller:	1-1/2 1
Formed concrete surfaces exposed to earth, water or weather; over, or in contact with, sewage; and for bottoms bearing on work mat, or slabs supporting earth cover - No. 5 bars and smaller: No. 6 through No. 18 bars:	1-1/2 2
Beams and Columns - For dry conditions - Stirrups, spirals and ties: Principal reinforcement: Exposed to earth, water, sewage or weather - Stirrups and ties: Principal reinforcement:	1-1/2 2 2 2-1/2
Walls - For dry conditions - No. 11 bars and smaller: No. 14 and No. 18 bars: Formed concrete surfaces exposed to earth, water, sewage or weather, or in contact with ground - Circular tanks with ring tension: All others:	1 1-1/2 2 2
Footings and Base Slabs - At formed surfaces and bottoms bearing on concrete work mat: At unformed surfaces and bottoms in contact with earth: Over top of piles: Top of footings -- same as slabs	 2 3 2

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Building frame members.
 - 2. Shear walls.
 - 3. Foundation walls.
 - 4. Supported slabs.
 - 5. Slabs on grade.
 - 6. Control, expansion and contraction joint devices.
- B. Related Sections:
 - 1. Section 03100 - Concrete Forms and Accessories: Formwork and accessories. Placement of joint device joint device anchors in formwork.
 - 2. Section 03200 - Concrete Reinforcement.
 - 3. Section 03350 - Concrete Finishing.
 - 4. Section 03390 - Concrete Curing.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 305 - Hot Weather Concreting.
 - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 - 4. ACI 308.1 - Standard Specification for Curing Concrete.
 - 5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - 6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 8. ASTM C150 - Standard Specification for Portland Cement.

9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.

34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96, Procedure A.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories, admixtures.
- C. Design Data:
 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 2. Identify mix ingredients and proportions, including admixtures.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 ACI 318.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.

1.6 COORDINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal Type IA - Air Entraining Type II - Moderate Type IIA - Air Entraining Type III - High Early Strength Type IIIA - Air Entraining Type IV - Low Heat of Hydration Type V - Sulfate Resistant Portland type; manufactured by; ASTM C595, list appropriate blend and cement type.
- B. Normal Weight Aggregates: ASTM C33.
 - 1. Coarse Aggregate Maximum Size: inches In accordance with ACI 318. Water: ACI 318; potable, without deleterious amounts of chloride ions with maximum percent of water soluble chloride ions by weight of cement.

2.2 ADMIXTURES

- A. Furnish materials in accordance with State Municipality of Highways Public Work's standards.
- B. Air Entrainment: ASTM C260.
- C. Chemical: ASTM C494/C494M Type A - Water Reducing Type B - Retarding Type C - Accelerating Type D - Water Reducing and Retarding Type E - Water Reducing and Accelerating Type F - Water Reducing, High Range Type G - Water Reducing, High Range and Retarding.
- D. Fly Ash Calcined Pozzolan: ASTM C618 Class.
- E. Silica Fume: ASTM C1240.
- F. Slag: ASTM C989; Grade 80 100 120; ground granulated blast furnace slag.
- G. Plasticizing: ASTM C1017/C1017M Type I, plasticizing Type II, plasticizing and retarding.

2.3 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion Polyvinyl Acetate Latex emulsion Two component modified epoxy resin Non-solvent two component polysulfide epoxy Mineral filled polysulfide polymer epoxy Mineral filled polysulfide polymer epoxy resin Polyamid cured epoxy.
- B. Vapor Retarder: ASTM E1745 Class A B C; 10 mil thick polyethylene film fabric reinforced plastic film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.

- C. Non-Shrink Grout: ASTM C1107, Grade A B C; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751 ASTM D994; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile.

***** OR *****

- B. Joint Filler Type B: ASTM D1752; Closed cell polyvinyl chloride molded vinyl foam, resiliency recovery of 95 percent if not compressed more than 50 percent of original thickness.

***** OR *****

- C. Joint Filler Type C: ASTM D1752; Premolded sponge rubber fully compressible with recovery rate of minimum 95 percent.
- D. Construction Joint Devices: Integral galvanized steel extruded plastic; inch thick, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge; manufactured by.
- E. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric vinyl neoprene filler strip with Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum vinyl cover plate, of longest manufactured length at each location, flush recessed mounted; color as selected; manufactured by.
- F. Sealant: ASTM D6690, Type I.

2.5 CONCRETE MIX

- A. Select proportions for normal weight concrete in accordance with ACI 301 Method 1
- B. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect/Engineer.
 - 1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
 - 2. Do not use calcium chloride nor admixtures containing calcium chloride.
 - 3. Use set retarding admixtures during hot weather.
 - 4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.
 - 5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag content as required by applicable code.

- C. Average Compressive Strength Reduction: Not permitted.
- D. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M ASTM C685/C685M.
- E. Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 ACI 318.
- B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends taping edges and ends.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.

- F. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- G. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- H. Install joint covers in one piece longest practical length, when adjacent construction activity is complete.
- I. Apply sealants in joint devices in accordance with Section 07900.
- J. Deposit concrete at final position. Prevent segregation of mix.
- K. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- L. Consolidate concrete.
- M. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- N. Place concrete continuously between predetermined expansion, control, and construction joints.
- O. Do not interrupt successive placement; do not permit cold joints to occur.
- P. Place floor slabs in checkerboard or saw cut pattern indicated.
- Q. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- R. Screed floors and slabs on grade level, maintaining surface flatness of F_f of 20 maximum 1/4 inch in 10 ft.

3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed concrete walls columns beams joists with smooth rubbed sand float sack rubbed finish as Scheduled in this section.
- B. Finish concrete floor surfaces in accordance with ACI 301 ACI 318.
- C. Wood float surfaces receiving quarry tile ceramic tile terrazzo with full bed setting system.
- D. Steel trowel surfaces receiving carpeting resilient flooring seamless flooring thin set quarry tile thin set ceramic tile.

- E. Steel trowel surfaces which are indicated to be exposed.
- F. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1/8 1/4 inch per foot nominal as indicated on drawings.

3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 1. Protect concrete footings from freezing for minimum 5 days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete in accordance with ACI 308.1
- D. Cure floor surfaces in accordance with ACI 301 ACI 318.
- E. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 7 days.
- F. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements 01700 - Execution Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field inspection and testing in accordance with ACI 318 applicable code.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured field cured.
 - 3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.

4. When volume of concrete for any class of concrete would provide less than 3 sets of cylinders, take samples from three randomly selected batches, or from every batch when less than 3 batches are used.
 5. Make one additional cylinder during cold weather concreting, and field cure.
- G. Field Testing:
1. Slump Test Method: ASTM C143/C143M.
 2. Air Content Test Method: ASTM C173/C173M ASTM C231.
 3. Temperature Test Method: ASTM C1064/C1064M.
 4. Measure slump and temperature for each compressive strength concrete sample.
 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- H. Cylinder Compressive Strength Testing:
1. Test Method: ASTM C39.
 2. Test Acceptance: In accordance with ACI 318 applicable code.
 3. Test one cylinder at 7 days.
 4. Test two cylinders at 28 days.
 5. Dispose remaining cylinders when testing is not required.
- I. Core Compressive Strength Testing:
1. Sampling and Testing Procedures: ASTM C42/C42M.
 2. Test Acceptance: In accordance with ACI 318 applicable code.
 3. Drill three cores for each failed strength test from concrete represented by failed strength test.
- J. Water Soluble Chloride Ion Concentration Test Method: ASTM C1218; tested at 28 days.
1. Maximum Concentration: As permitted by applicable code.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections as directed by Architect/Engineer in accordance with ACI 301 ACI 318.

3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

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Service Facility Precinct No.4
Linn-San Manuel, Texas

- B. Repair or replacement of defective concrete will be determined by Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

END OF SECTION

SECTION 03350

CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

Specifier Note: Select paragraph(s) below to conform to project requirements.

1. Double application cure-seal-hardener for new concrete floors.
2. Precautions for avoiding staining concrete before and after application.

B. Related Section:

1. Cast-In-Place Concrete: Division 03 Cast-In-Place Concrete sections.

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
2. ASTM C779 Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
3. ASTM C805 Standard Test Method for Rebound Number of Hardened Concrete.
4. ASTM C1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
5. ASTM D3359 Standard Test Methods for Measuring Adhesion by Tape Test.
6. ASTM G23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Withdrawn 2000).

1.3 SUBMITTALS

- A. Section 01330 – Submittal Procedures
- B. Product Data: Submit product data, including manufacturer's SPEC-DATA® sheet, installation instructions and technical bulletins for specified products.
- C. Certificates: Manufacturer's certification that the installer is acceptable.
- D. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Ashford Formula can only be installed by Certified Applicators
For Certified installers call Deek Rife at 402.598.0801

1.5 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 01 Product Requirements section.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- D. Handling: Protect materials from dirt, corrosion, oil, grease and other contaminants.

PART 2 PRODUCTS

2.1 MATERIAL

- A. Manufacturer: Curecrete Distribution, Inc.
 - 1. Contact: 1203 W. Spring Creek Place, Springville, UT 84663-0551; Telephone: (800) 998-5664, (801) 489-5663; Fax: (801) 489-3307; website: www.ashfordformula.com.
- B. Cure-Seal-Hardener: Ashford Formula, a water-based chemically reactive penetrating sealer and hardener that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, and allows concrete to achieve full compressive strength, minimizing surface crazing and eliminating dusting.
 - 1. Abrasion Resistance to Revolving Disks: At least a 32.5% improvement over untreated samples when tested in accordance with ASTM C779.
 - 2. Surface Adhesion: At least a 22% increase in adhesion for epoxy when tested in accordance with ASTM D3359.
 - 3. Hardening: As follows when tested in accordance with ASTM C39:
 - a. After 7 Days: An increase of at least 40% over untreated samples.
 - b. After 28 Days: An increase of at least 38% over untreated samples.
 - 4. Coefficient of Friction: 0.86 dry, 0.69 wet when tested in accordance with ASTM C1028.
 - 5. Rebound Number: An increase of at least 13.3% over untreated samples when tested in accordance with ASTM C805.
 - 6. Light Exposure Degradation: No evidence of adverse effects on treated samples when tested in accordance with ASTM G23.

2.2 PRODUCT SUBSTITUTIONS

- A. Substitutions: No Substitutions permitted

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Do not use frozen material. Thaw and agitate prior to use.
- D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

3.4 INSTALLATION.

- A. All work must be performed by an applicator certified by the manufacturer. Certification credentials are required.
- B. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to work on after troweling; with colored concrete, wait a minimum of 30 days before application.
 - 1. Spray on at rate of 200 ft²/gal (5 m²/L).
 - 2. Keep surface wet with cure-seal-hardener for a minimum soak-in period of 30 minutes without allowing it to dry out or become slippery. In hot weather, slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply additional cure-seal-hardener as needed to keep the entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state. In hot weather conditions, follow manufacturer's special application procedures.
 - 3. When the treated surface becomes slippery after this period, lightly mist with water until slipperiness disappears.
 - 4. Wait for surface to become slippery again, and then flush entire surface with water to remove all cure-seal-hardener residue.

5. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
6. Wet vacuum or scrubbing machines can be used in accordance with manufacturer's instructions to remove residue.
7. Repeat process after 7 days

3.5 PROTECTION

- A. Protect installed floors for at least 3 months until chemical reaction process is complete.
 1. Do not allow traffic on floors for 3 hours after application.
 2. Do not allow parking of vehicles on concrete slab.
 3. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
 4. Do not allow pipe cutting using pipe cutting machinery on concrete slab.
 5. Do not allow temporary placement and storage of steel members on concrete slabs.
 6. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
 7. Clean floor regularly in accordance with manufacturer's recommendations.

END OF SECTION

**SECTION 03360
SPECIAL CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SUMMARY

This section includes the following:

- 1.01 - SECTION INCLUDES
 - A. Liquid hardeners to protect horizontal concrete surfaces.
- 1.02 - RELATED SECTIONS
 - A. Section 01 74 00 - Cleaning and Waste Management
 - B. Section 07 09 00 – Joint sealants
 - C. Section 03 31 00 - Structural Concrete
 - 1. Grinding & Polishing of Concrete
 - 2. Application of the Ashford Formula
 - 3. Ashford Formula Owners Manual
 - 4. Ashford Formula Test Results
 - F. Related Work:
 - 1. Section 03300 Cast-In-Place Concrete

1.02 REFERENCES

- A. American Society for Testing and Materials: ASTM C 1028 Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method.
- B. ASTM D 3278 Standard Test Method for Flash Point of Liquids by Small Scale Closed Cup Apparatus.
- C. ASTM D 3363-05 Standard Test Method for Film Hardness by Pencil Test.
- D. ASTM E 430 Standard Test Method for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry.
- E. Rilem Test Method -Test No. 11.4 Measurement of Water Absorption Under Low Pressure.
- F. ASTM-C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
- G. ASTM G23-81, Ultraviolet Light & Water Spray
- H. ASTM C805, Impact Strength
- I. American Concrete Institute
- J. ACI 302. 1-89, Guide for Concrete Floor and Slab Construction
- K. Other Test
 - 1. Reflectivity

1.03 SUBMITTALS

- A. Submit in accordance with Section 01330 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data sheets on all products to be used for the work. Submit description for protection of surrounding areas, surface preparation, application, and final cleaning.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- D. Manufacturer's acknowledgement of applicator qualifications.
- E. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).

- F. Product Variations: Retro Plate 99
 - 1. The variegated colors and appearance are unique to each concrete surface and depend on the chemical composition, mix design, porosity, age, texture and color of the concrete substrate. Mottling and wide variations in color and intensity may occur. If contaminants remain on the surface, the penetration of the Retro-Pel may be blocked. Concrete from different loads or pours, and in patched areas, may appear significantly
 - 2.) No private label products will be accepted.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Use only a Factory RetroPel installer and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
 - 2. The special concrete finish manufacturer, Ashford Formula/RetroPel shall approve the applicator. No other applicators are allowed, Ashford Formula will provide a job specific letter per job.
 - 3. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 5 projects of at least 15,000 square feet each.
- B. Manufacturer's Certification
 - 1. Provide letter of certification from Retro Plate, stating that installer is listed applicator of special concrete finishes, and has completed the RetroPel Certified Installer Training Program.
- C. Mock Up
 - 2. Mock-up size: 10'x10' floor area at job site, at location as directed under conditions similar to those which will exist during actual placement.
 - 3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, color selection and shine level.
 - 4. Allow 24 hours for inspection of mock-up before proceeding with work
 - 5. When accepted, mock-up will demonstrate minimum standard of quality required for this project

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.
- B. Dispense special concrete finish material from factory and sealed containers.
- C. Store containers upright in a cool, dry, well, ventilated place, out of the sun with temperature between 40 and 100 degrees F (4 and 38 degrees C).
- D. Protect from freezing.
- E. Store away from all other chemicals and potential sources contamination.
- F. Keep lights, fire, sparks and heat away from containers.
- G. Do not drop containers or slide across sharp objects.
- H. Do not stack pallets more than three high.
- I. Keep containers tightly closed when not in use.
- J. Store and handle materials in accordance with manufacturer's written instructions.

1.06 PROJECT CONDITIONS

- A. Environmental limitations:
 - 1. Comply with manufacturer's written instructions for substrate temperature

and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.

- B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.
- C. The completed slab will be covered to prevent damage by the other trades during store completion.
- D. Temperature Limitations:
- E. Do not apply when surface and air temperature are below 40 degrees F or above 95 degrees F unless otherwise indicated by manufacturer's written instructions.
- F. Do not apply when surface and air temperatures are not expected to remain above 40 degrees F for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- G. Do not apply under windy conditions such that the concrete surface treatment may be blown to surfaces not intended.
- H. Do not apply to frozen substrate. Allow adequate time for substrate to thaw, if freezing conditions exist before application.
- I. Do not apply earlier than 24 hours after rain or if rain is predicted for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- J. Temporary Lighting: Minimum 200 W light source, placed 8 feet (2.5 m) above horizontal concrete surface, for each 425 square feet (40 sq m) of concrete being finished.
- K. Temporary Heat: Ambient temperature of 50 degrees F (10 degrees C) minimum.
- L. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.

1.07 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Manufacturer's Warranty: Submit for owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit, other rights Owner may have under Contract Documents

PART 2 – PRODUCTS

2.01 MATERIALS AND MANUFACTURERS

- A. RetroPel: Advanced Floor Products, RetroPlate Systems
 - 1. Contact: P O Box 80533, Provo, UT 84605, Telephone: (800)998-5664; Deke Rife, (402)598-0801, deke@retroplatesystem.com

Factory Trained and Certified Applicator: For an approved applicator contact:
Advanced Floor Products, Deke Rife (402)598-0801
deke@retroplatesystem.com

- 1. Only approved Retro Plate Certified Trained applicators allowed.

2.02 RELATED MATERIALS

- A. Water:
 - 1. Potable

PART 3- EXECUTION

3.01 SURFACE CONDITIONS:

- A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.
- B. Verify that base slab meet finish and surface profile requirements in Division 3 Section "Cast-In-Place Concrete," and Project Conditions above.
- C. Prior to application, verify that floor surfaces are free of construction latents.
- D. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- E. Verify by examination that masonry and concrete surfaces are acceptable to receive the specified products. Notify the Architect if surfaces are not acceptable to receive the specified products.
- F. Preparation
- G. Clean dirt, dust, oil, grease and other contaminants from surfaces that interfere with penetration or performance of specified product. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of product.
- H. Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of product.
- I. Variations in substrate texture and color will affect final appearance and should be corrected prior to application of sealer/hardener system and the polishing steps.
- J. Protect surrounding areas prior to application. If accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.
- K. Avoid contact in areas not to be treated. Avoid contact with metal, glass and painted surfaces.
- L. Seal open joints in accordance with Section 07 90 00 - Joint Protection.
- M. Apply specified sealants and caulking and allow complete curing before application of Liquid Hardener.
- N. Apply products to substrates in accordance with manufacturer's instructions, and application procedures. Confirm instructions on current Product Data Sheet that can be found on manufacturers website, www.retroplatesystem.com
- O. Apply to clean, dry, and properly prepared surfaces approved by the Architect.
- P. Clean surface with an auto-scrubber using recommended Crete Clean Plus to remove all surface dust and debris before grinding or polishing.
- Q. Remove and dispose of all waste from the process of grinding, polishing, either dry or wet and cleaning in accordance with all environmental regulations.
- R. After initial grind, move up in grind levels in two perpendicular crossing passes without skipping level until one level below finish level.
- S. Apply RetroPel as recommended by the manufacturer, estimated coverage to be 250 square feet per gallon. Actual coverage rate is to be determined by slab surface. Apply as per manufactures instructions
- T. Do not dilute or alter products. Apply as packaged.
- U. Do not apply to painted surfaces.

3.02 EQUIPMENT:

- A. Generally the grinding machines must be adequate for the size of the job.
 - 1. Initial grinding should be done with an Eagle Solutions Propane Powered grinder/polisher with Planetary/Counter rotating concrete grinding heads. Grinders will be 1100 lbs with 700 lbs of head weight. It gives the best preliminary scratch pattern needed for a good finished sheen.

B. SCOPE OF WORK

The following Advanced Ashford process must be used. An Eagle Solutions concrete grinding machine with Planetary Heads/counter rotating must be used. The remaining process follows: All grinding will be done wet, to allow for the most uniform scratch patterns

1. No sooner than 28 days after the slab is poured, can work be started
2. Clean floor with floor buffer
3. Wet grind floor with 400 grit resin bonded diamonds
4. Apply RetroPel to the floor as recommended by manufacturer. 2 coats may be needed

Edges: Edge detail work needs to be performed with an eagle Solution SP-13 Edge Grinder using all the same steps and diamond tooling as listed above.

END OF SPECIFICATION

SECTION 03390

CONCRETE CURING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes initial and final curing of horizontal and vertical concrete surfaces.
- B. Related Sections:
 - 1. Section 03300 - Cast-In-Place Concrete.
 - 2. Section 03350 - Concrete Finishing.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
 - 3. ACI 308.1 - Standard Specification for Curing Concrete.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - 4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on curing compounds.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 ACI 302.1 ACI 318.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound Type 1

- B. Water: Potable, not detrimental to concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1.
- B. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.

***** [OR] *****

- C. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

***** [OR] *****

- D. Absorptive Mat: Spread cotton fabric over floor slab areas. Spray with water until mats are saturated, and maintain in saturated condition for 7 days.

***** [OR] *****

- E. Absorptive Mat: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.

END OF SECTION

SECTION 03600

GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Portland cement grout.
 - 2. Rapid curing epoxy grout.
 - 3. Non-shrink cementitious grout.
- B. Related Sections:
 - 1. Section 03300 - Cast-in-Place Concrete.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
- B. American Society of Testing and Materials:
 - 1. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 2. ASTM C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
 - 3. ASTM C150 - Standard Specification for Portland Cement.
 - 4. ASTM C191 - Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
 - 5. ASTM C307 - Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
 - 6. ASTM C531 - Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - 7. ASTM C579 - Test Method for Compressive Strength of Chemical-Resistant Mortars, Grouts, monolithic Surfacing and Polymer Concretes.
 - 8. ASTM C827 - Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
- C. U. S. Army Corps of Engineers Concrete Research Division (CRD):
 - 1. CRD C621 - Non-Shrink Grout.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I and II.
- B. Water:
1. Potable; containing no impurities, suspended particles, algae or dissolved natural salts in quantities capable of causing:
 - a. Corrosion of steel.
 - b. Volume change increasing shrinkage cracking.
 - c. Efflorescence.
 - d. Excess air entraining.
- C. Fine Aggregate:
1. Washed natural sand.
 2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
 3. Free from injurious amounts of organic impurities as determined by ASTM C40.
- D. Mix:
1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes.

2.2 RAPID CURING EPOXY GROUT

- A. Rapid Curing Epoxy Grout: High strength, three component epoxy grout formulated with thermosetting resins and inert fillers. Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids and alkalies.

Compressive Strength	ASTM C579	12,000 psi at 7 days
Tensile Strength	ASTM C307	2,000 psi minimum
Coefficient of Expansion	ASTM C531	30×10^{-6} in per degree F
Shrinkage	ASTM C827	None

2.3 NON-SHRINK CEMENTITIOUS GROUT

- A. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Type D non-shrink grout:

Property	Test	Time	Result
Setting Time	ASTM C191	Initial	2 hours (Approx)
		Final	3 hours (Approx)
Expansion			0.10% - 0.4% Maximum

Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	10,000 psi to 10,800 psi

2.4 FORMWORK

- A. Refer to Section 03100 for formwork requirements.

2.5 CURING

- A. Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or with use of wet burlap method.

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.
- B. Rough concrete lightly, but not enough to interfere with placement of grout.
- C. Remove foreign materials from metal surfaces in contact with grout.
- D. Align, level and maintain final positioning of components to be grouted.
- E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

3.2 MIXING

- A. Portland Cement Grout:
1. Use proportions of 2 parts sand and 1 part cement, measured by volume.
 2. Prepare grout with water to obtain consistency to permit placing and packing.
 3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.
 4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.
 5. Do not add additional water after grout has been mixed.
 6. Capable of developing minimum compressive strength of 2400 psi in 48 hours and 7000 psi in 28 days.

***** [OR] *****

3.3 PLACING GROUT

- A. Place grout material quickly and continuously.
- B. Do not use pneumatic-pressure or dry-packing methods.
- C. Apply grout from one side only to avoid entrapping air.
- D. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.
- E. Thoroughly compact final installation and eliminate air pockets.
- F. Do not remove leveling shims for at least 48 hours after grout has been placed.

3.4 CURING

- A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. After grout has attained its initial set, keep damp for minimum of 3 days.

3.5 FIELD QUALITY CONTROL

- A. Submit proposed mix design of each class of grout to inspection and testing firm for review prior to commencement of Work.
- B. Tests of grout components may be performed to ensure conformance with specified requirements.

END OF SECTION

SECTION 04065

MASONRY MORTAR AND GROUT

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes mortar and grout for masonry.
- B. Related Sections:
 - 1. Section 04810 - Unit Masonry Assemblies: Installation of mortar and grout.
 - 2. Section 04820 - Reinforced Unit Masonry Assemblies: Installation of mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
 - 1. ASTM C5 - Standard Specification for Quicklime for Structural Purposes.
 - 2. ASTM C91 - Standard Specification for Masonry Cement.
 - 3. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 - 4. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 - 5. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 6. ASTM C150 - Standard Specification for Portland Cement.
 - 7. ASTM C199 - Standard Test Method for Pier Test for Refractory Mortars.
 - 8. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
 - 9. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
 - 10. ASTM C387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
 - 11. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
 - 12. ASTM C476 - Standard Specification for Grout for Masonry.
 - 13. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
 - 14. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
 - 15. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.
 - 16. ASTM C1142 - Standard Specification for Extended Life Mortar for Unit Masonry.
 - 17. ASTM C1314 - Standard Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry.

- 18. ASTM C1329 - Standard Specification for Mortar Cement.
- 19. ASTM C1357 - Standard Test Method for Evaluating Masonry Bond Strength.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01600 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 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.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Portland Cement: ASTM C150, Type I
- B. Calcium chloride is not permitted.

2.2 MIXES

- A. Mortar Mixes:
 - 1. Extended Life Mortar: ASTM C1142, Type RS
- B. Mortar Mixing:
 - 1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
 - 2. Achieve uniformly damp sand immediately before mixing process.
 - 3. Re-temper only within two hours of mixing.

- C. Grout Mixes:
 - 1. Grout for Non-Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
 - 2. Grout for Structural Masonry: 3,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 grout.
 - 3. Application:
 - a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
 - b. Fine Grout: For grouting other spaces.
- D. Grout Mixing:
 - 1. Mix grout in accordance with ASTM C94/C94M, modified to use ingredients complying with ASTM C476.
 - 2. Add admixtures; mix uniformly.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Request inspection of spaces to be grouted.

3.2 INSTALLATION

- A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

3.3 FIELD QUALITY CONTROL

- A. Establishing Mortar Mix: In accordance with ASTM C270.
- B. Testing Frequency: One set of specified tests for every 5,000 sf of completed wall area.
- C. Testing of Mortar Mix: In accordance with ASTM C780 for aggregate ratio and water content, air content, consistency, and compressive strength.
- D. Testing of Grout Mix: In accordance with ASTM C1019 for compressive strength, and in accordance with ASTM C143/C143M for slump.
- E. Test compressive strength of mortar and masonry to ASTM C1314; test in accordance with masonry unit sections specified.

END OF SECTION

SECTION 04210

ARCHITECTURAL BRICK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Face Brick
- B. Hollow Brick
- C. Thin Brick

1.2 RELATED SECTIONS

- A. Section 04060 – Masonry Mortar
- B. Section 04070 – Masonry Grout
- C. Section 04080 – Masonry Reinforcement Systems
- D. Section 04090 – Masonry Accessories
- E. Section 04810 – Unit Masonry Assemblies
- F. Section 05400 – Cold-Formed Metal Framing: Structural wall backing
- G. Section 05500 – Metal Fabrications: Execution requirements for loose steel lintels and fabricated steel items for placement in this section.
- H. Section 06112 – Framing and Sheathing: Structural wall backing
- I. Section 07260 – Vapor Retarders: Vapor retarder membrane placed on interior face of wall insulation.
- J. Section 07270 – Air Barriers: Air barrier placed on interior face of wall insulation.
- K. Section 07620 – Sheet Metal Flashing and Trim: Product requirements for reglets for flashings for placement by this section.
- L. Section 07650 – Flexible Flashing: Product requirements for flexible flashings for placement by this section.
- M. Section 07900 – Joint Sealers: Rod and sealant at control and expansion joints.

1.3 ALLOWANCES

- A. Allowances: Include under provisions of Section 01200 Price and Payment Procedures: Allowances. Allowance includes furnishing face brick, hollow brick and thin brick units. Installation is included in this section and is part of Contract Sum/Price.

1.4 REFERENCES

- A. ASTM C-62 – Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale).

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- D. Selection Samples: For each finish product specified, two complete sets of color brick representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each product specified, two samples of four brick each, representing actual product, color, and texture.
- F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

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

- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Construct sample panel at location indicated or directed, and as follows:
 - a. Size: 6 feet wide x 8 feet high (1.2m x 2.4m).
 - b. Include all unit types and sizes to be used, and mortar joint treatment.
 - c. Obtain Architect's acceptance of sample panel before beginning construction activities of this section.
 - d. Do not remove sample panel until construction activities of this section have been accepted by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Deliver products of this section on pallets, with individual faces protected; keep dry.

1.8 PROJECT CONDITIONS

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Old Texas Brick, which is located at: 8510 South Cage Blvd; Pharr, TX 78577; Tel: (956)781-2120; Fax: (956)781-2172 Email: request info (sales@oldtexasbrick.com) ; Web: www.oldtexasbrick.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 ARCHITECTURAL BRICK

- A. Regional Materials: Provide materials that are regionally, extracted, processed and manufactured within a radius of 500 miles from Project.
- B. Provide brick similar in texture, color and physical properties to those available for inspection at the Architect's office and/or as supplied on the approval sample panel.
- C. Shapes: Provide special shapes as required.
- D. All brick supplied shall be pre-blended by the manufacturer.
<http://www.brick.com/md/index.htm>

2.3 FACE BRICK

- A. Face Brick ASTM C 62 Grade: SW
 - 1. Normal Size: 2-1/4 inches deep, 5 inches high, 10 inches long.
 - a. Color/Texture: full color range offered by supplier to be selected by Architect
 - 2. Oversized: 2-1/4 inches Deep, 8 inches high, 16 inches long.
 - a. Color/Texture: full color range offered by supplier to be selected by Architect

2.4 SPECIAL SHAPES

- A. Provide special shapes as indicated on the Drawings.
- B. Special Brick Shapes include

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify built-in items are in proper location, and ready for roughing into masonry work.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

3.3 INSTALLATION

- A. Install architectural brick as specified on Section 04810 Unit Masonry Assemblies.
- B. Install architectural brick in accordance with manufacturer's instructions.
- C. Maintain masonry courses to uniform dimensions. Form bed and head joints of uniform thickness.
- D. Lay masonry in bond pattern or as otherwise indicated on Drawings.
- E. Lay masonry with full head and bed joints.
- F. Where fresh mortar joins partially set mortar, remove loose brick and mortar, and lightly wet exposed surface of set masonry.
- G. When adjustment is necessary to be made after mortar begins to harden, remove hardened mortar and replace with fresh mortar.
- H. Joint Profile: Tool mortar joints to a concave appearance.
- I. Joint Profile: Tool mortar joints to a concave V-shaped appearance.
- J. Joint Profile: Tool mortar joints to a concave grapevine appearance.
- K. Tool exposed joints when "thumb-print" hard.
- L. Flush cut all joints not tooled.
- M. When pointing, rake mortar joints to a depth of not less than 1/2 inch (12mm). Fill solidly with pointing mortar in 1/4 inch layers. Tool joints.

3.4 FLASHING

- A. Provide flashing embedded in masonry as specified in Section 07620 Sheet Metal Flashing and Trim or Section 07650 Flexible Flashing.
- B. Clean surface of masonry from projections, which might puncture flashing.
- C. Place through-wall flashing on bed of mortar.
- D. Cover flashing with mortar on brick shelf. Lay brick dry on shelf angles and lintels.
- E. Lap flashing a minimum of 6 inches (150mm).
- F. Leave flashing projecting from face of wall approximately 1 inch (25mm). Flashing shall be cut back to the face of the wall after inspection.

3.5 WEEPHOLES

- A. Provide weep holes in head joints of the first brick course immediately above flashing by placing weeps no more than 24 inches (610mm) on center horizontally.
- B. Keep cavity free from mortar.

3.6 EXPANSION JOINTS

- A. Keep clean from all mortar and debris.
- B. Locate as shown on drawing.
- C. Install backer rod.
- D. Install sealant. Prime surfaces if necessary.

3.7 CLEANING

- A. Cut out all defective mortar joints and holes in exposed masonry and repoint with new mortar.
- B. Remove excess mortar and mortar smears as work progresses.

- C. All cleaning practices and product used shall be in accordance with cleaning products manufacturer's printed instructions.
- D. Use non-metallic tools in cleaning operations.

3.8 PROTECTION

- A. Protect installed products until completion of project.
- B. Protect exposed external corners subject to damage.
- C. Protect base of walls from mud and mortar splatter.
- D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.
- E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.
- F. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 04820

REINFORCED UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes concrete masonry units, reinforcement, anchorage, and accessories.
- B. Related Sections:
 - 1. Section 04065 - Masonry Mortar and Grout: Mortar and grout.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 530 - Building Code Requirements for Masonry Structures.
 - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
 - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - 3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 4. ASTM A580/A580M - Standard Specification for Stainless Steel Wire.
 - 5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 6. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 7. ASTM A951 - Standard Specification for Masonry Joint Reinforcement.
 - 8. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - 9. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - 10. ASTM C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
 - 11. ASTM C34 - Standard Specification for Structural Clay Load-Bearing Wall Tile.
 - 12. ASTM C55 - Standard Specification for Concrete Brick.
 - 13. ASTM C56 - Standard Specification for Structural Clay Non-Load-Bearing Tile.
 - 14. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
 - 15. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.

16. ASTM C73 - Standard Specification for Calcium Silicate Face Brick (Sand-Lime Brick).
17. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
18. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units.
19. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
20. ASTM C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units.
21. ASTM C212 - Standard Specification for Structural Clay Facing Tile.
22. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
23. ASTM C315 - Standard Specification for Clay Flue Linings.
24. ASTM C530 - Standard Specification for Structural Clay Non-Loadbearing Screen Tile.
25. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
26. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
27. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
28. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces.
29. ASTM C1283 - Standard Practice for Installing Clay Flue Lining.
30. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
31. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
32. 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. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

1.3 PERFORMANCE REQUIREMENTS

- A. Concrete Masonry Compressive Strength (f'm): 2,000 psi;
1. Concrete Masonry Units: 1900 psi minimum net area compressive strength.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate bars sizes, spacings, locations, reinforcement quantities, bending and cutting schedules, supporting and spacing devices for reinforcement.

C. Product Data:

1. Submit data for masonry units and fabricated wire reinforcement.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Product Requirements.

B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

C. Hot Weather Requirements: In accordance with ACI 530.1 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.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Hollow Load Bearing Concrete Masonry Units (CMU): ASTM C90; normal weight.

2.2 ACCESSORIES

A. Single Wythe Joint Reinforcement: ASTM A951; ladder type; 0.148 inch diameter side rods with 0.148 inch diameter cross ties.

B. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars.

C. Anchor Rods: ASTM A307; Grade C; J-shaped or L-shaped; complete with washers and heavy hex nuts; sized for minimum 15 inch embedment.

1. Hot-Dipped Galvanizing: ASTM A153/A153M.

2. Mechanical Galvanizing: ASTM B695; Class 55.

D. Mortar and Grout: As specified in Section 04065.

- E. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding.

2.3 SOURCE QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Test brick efflorescence in accordance with ASTM C67. Brick rated greater than “slightly effloresced” is not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied to other Sections.
- B. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.
- C. Wet clay and shale brick before laying when initial rate of absorption is greater than 30 grams when tested in accordance with ASTM C67.

3.3 INSTALLATION

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
- C. Coursing of Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Placing And Bonding:
 - 1. Lay solid masonry units in full bed of mortar, with full head joints.
 - 2. Lay hollow masonry units with face shell bedding on head and bed joints.

3. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
4. Remove excess mortar as Work progresses.
5. Interlock intersections and external corners.
6. 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 proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
8. Isolate masonry from vertical structural framing members with movement joint .
9. Isolate top of masonry from horizontal structural framing members and slabs or decks.

E. Joint Reinforcement And Anchorage:

1. Install horizontal joint reinforcement 16 inches oc.
2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
3. Place joint reinforcement continuous in first and second joint below top of walls.
4. Lap joint reinforcement ends minimum 6 inches.
5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
6. Embed anchors embedded in concrete attached to structural steel members. Embed anchorages in every sixth brick.

F. Lintels:

1. Install precast concrete lintels over openings.
2. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled or indicated.
3. Openings Up To 42 inches Wide: Reinforce openings as indicated on Drawings.
4. Openings From 42 inches Up To 78 inches Wide: Reinforce openings as indicated on Drawings.
5. Openings Over 78 inches: Reinforce openings as indicated on Drawings.
6. Do not splice reinforcing bars.
7. Support and secure reinforcing bars from displacement.
8. Place and consolidate grout fill without displacing reinforcing.
9. Allow masonry lintels to attain specified strength before removing temporary supports.
10. Maintain minimum 8 inches bearing on each side of opening.

G. Grouted Components:

1. Reinforce bond beam with 1, No. 5 bar.
2. Reinforce pilaster with 1, No. 6 bar in each cell.
3. Lap splices bar diameters required by code.
4. Support and secure reinforcing bars from displacement.
5. Place and consolidate grout fill without displacing reinforcing.
6. At bearing locations, fill masonry cores with grout for minimum 12 inches either side of opening.

- H. Reinforced Masonry:
 - 1. Lay masonry units with cells vertically aligned and cavities between wythes clear of mortar and unobstructed.
 - 2. Place reinforcing, reinforcement bars, and grout as indicated on Drawings.
 - 3. Splice reinforcement in accordance with Section 03200.
 - 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.
- I. Control And Expansion Joints:
 - 1. Install control and expansion joints at the following maximum spacings, unless otherwise indicated on Drawings:
 - a. Exterior Walls: 20 feet on center and within 10 feet on one side of each interior and exterior corner.
 - b. Interior Walls: 30 feet on center.
 - c. At changes in wall height.
 - 2. Do not continue horizontal joint reinforcement through control and expansion joints.
 - 3. Install preformed control joint device in continuous lengths. Seal butt and corner joints.
 - 4. Size control joint in accordance with Section 07900 for sealant performance.
 - 5. Form expansion joint by omitting mortar and cutting unit to form open space.
- J. Cutting And Fitting:
 - 1. 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.

3.4 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Alignment of Pilasters: 1/4 inch.
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- G. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

- I. 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.

3.5 FIELD QUALITY CONTROL

- A. Concrete Masonry Units: Test each type in accordance with ASTM C140.

3.6 CLEANING

- A. Section 01700 - Execution Requirements: Final cleaning.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01700 - Execution Requirements: Requirements for protecting finished Work.
- B. Protect exposed external corners subject to damage.
- C. Protect base of walls from mud and mortar splatter.
- D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.
- E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural shapes.
 - 2. Channels and angles.
 - 3. Hollow structural sections.
 - 4. Structural pipe.
 - 5. Structural plates and bars.
 - 6. Fasteners, connectors, and anchors.
 - 7. Fasteners, connectors, and anchors.
 - 8. Grout.
- B. Related Sections:
 - 1. Section 03600 - Grout: Grout for setting base plates.
 - 2. Section 05210 - Steel Joists.
 - 3. Section 05312 - Steel Roof Deck
 - 4. Section 05500 – Metal Fabrications: Steel Fabrications affecting structural steel work.

1.2 REFERENCES

- A. American Institute of Steel Construction:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
 - 3. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
 - 4. AISC Seismic Provisions for Structural Steel Buildings.
 - 5. AISC Specification for Allowable Stress Design of Single-Angle Members.
 - 6. AISC Specification for the Design of Steel Hollow Structural Sections.
 - 7. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
9. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
10. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and Studs.
11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
12. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
14. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding.
15. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
16. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
18. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm) Thick.
19. ASTM A618 - Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.
20. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
21. ASTM A847 - Standard Specification for Cold-Formed Welded and Seamless High Strength, Low Alloy Structural Tubing with Improved Atmospheric Corrosion Resistance.
22. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4 in. (100 mm) Thick.
23. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST).
24. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.

25. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 26. ASTM E94 - Standard Guide for Radiographic Examination.
 27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
 28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
 29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
 30. ASTM F436 - Standard Specification for Hardened Steel Washers.
 31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
 32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
 33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- C. American Welding Society:
1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Research Council on Structural Connections:
1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.
- E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
 2. SSPC Paint 15 - Steel Joist Shop Paint.
 3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
 4. SSPC SP 3 - Power Tool Cleaning.
 5. SSPC SP 6 - Commercial Blast Cleaning.
 6. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and fasteners.
 2. Connections.
 3. Cambers
 4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Mill Test Reports: Submit indicating structural strength and destructive and non-destructive test analysis.

- D. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualifications within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 2. AISC Code of Standard Practice for Steel Buildings and Bridges. Section 10.
 - 3. AISC Seismic Provisions for Structural Steel Buildings.
 - 4. AISC Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
 - 5. AISC Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
 - 6. AISC Specification for the Design of Steel Hollow Structural Sections.
 - 7. AISC Specification for Allowable Stress Design of Single-Angle Members.
 - 8. AISC Load and Resistance Factor Design Specification for Single-Angle Members.
 - 9. RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
 - 10. ASCE 19.

1.5 COORDINATION

- A. Section {01300 - Administrative Requirements}: Requirements for coordination.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural W-Shapes: ASTM A992/A992M; Grade 50
- B. Structural M-Shapes: ASTM A36/A36M; Grade 50
- C. Structural T-Shapes: Cut from structural W-shapes.
- D. Channels and Angles: ASTM A36/A36M.
- E. Round Hollow Structural Sections: ASTM A500, Grade B.
- F. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade B.

- G. Structural Plates and Bars: ASTM A36/A36M.

2.2 FASTENERS, CONNECTORS, AND ANCHORS

- A. Bolts: ASTM A307; Grade A or B.
 - 1. Finish: Unfinished
- B. High Strength Bolts: ASTM A325; Type 1 or ASTM A490; Type 1.
 - 1. Finish: Unfinished
- C. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Unfinished
- D. Washers: ASTM F436; Type 1, circular
 - 1. Finish: Unfinished
- E. Threaded Rods: ASTM A36/A36M; Grade A.
 - 1. Finish: Unfinished
- F. Forged Structural Steel Hardware:
 - 1. Clevises and Turnbuckles: ASTM A108; Grade 1085.
 - 2. Eye Nuts and Eye Bolts: ASTM A108; Grade 1030.
 - 3. Sleeve Nuts: ASTM A108; Grade 1018.
 - 4. Rod Ends, Yoke Ends and Pins, Cotter Pins, and Coupling Nuts: Carbon steel.

2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.

2.4 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days
- B. Shop and Touch-Up Primer: SSPC Paint 15, Type 1, red oxide.

2.5 FABRICATION

- A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- B. Fabricate connections for bolt, nut, and washer connectors.
- C. Develop required camber for members.

2.6 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP 3.
- B. Shop prime structural steel members.
- C. Galvanizing for Structural Steel Members: ASTM A123/A123M; minimum 1.2 oz/sq ft coating thickness; galvanize after fabrication.
- D. Galvanizing for Fasteners, Connectors, and Anchors:
 - 1. Hot-Dipped Galvanizing: ASTM A153/A153M.
 - 2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01400 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify bearing surfaces are at correct elevation.
- C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

- A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components and shear connectors indicated on Drawings.
- C. Field connect members with threaded fasteners; tighten to snug tight for bearing type connections.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

- A. Grout [under base plates in accordance with Section 03600.
- B. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.
- C. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.
- D. Moist cure grout.
- E. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.
- F. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- C. Maximum Offset From Alignment: 1/4 inch.

3.6 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Bolted Connections: Inspect in accordance with AISC specifications.
 - 1. Visually inspect all bolted connections.

2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.
- C. Welding: Inspect welds in accordance with AWS D1.1.
1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Visually inspect all welds.
 3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
 4. Liquid Penetrant Inspection: ASTM E165.
- D. Correct defective bolted connections and welds.

END OF SECTION

SECTION 05210

STEEL JOISTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Open web steel joists and shear stud connectors, with bridging, attached seats and anchors.
- B. Related Sections:
 - 1. Section 05120 - Structural Steel: Superstructure framing.
 - 2. Section 05312 - Steel Roof Deck
 - 3. Section 05500 - Metal Fabrications: Non-framing steel fabrications attached to joists.

1.2 REFERENCES

- A. American Institute of Steel Construction:
 - 1. AISC Seismic Provisions for Structural Steel Buildings.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A108 - Standard Specification for Steel Bars, Carbon, Cold Finished, Standard Quality.
 - 3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - 6. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 7. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
 - 8. ASTM F436 - Standard Specification for Hardened Steel Washers.
 - 9. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- D. Steel Joist Institute:
 - 1. SJI K - Standard Specifications for Open Web Steel Joists, K-series.

2. SJI LH/DLH - Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series.
 3. SJI JG - Standard Specification for Joist Girders.
- E. SSPC: The Society for Protective Coatings:
1. SSPC - Steel Structures Painting Manual.
 2. SSPC SP 1 - Solvent Cleaning.
 3. SSPC SP 10 - Near-White Blast Cleaning.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings:
1. Indicate standard designations, configuration, sizes, spacing, locations of joists, joist leg extensions.
 2. Joist coding, bridging, connections, attachments.
 3. Cambers
 4. Connection details.
- C. Welders' Certificates: Submit manufacturer's certificates, certifying welders employed on the Work, verifying AWS qualification within previous 12 months.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
1. SJI K, SJI LH/DLH, and SJI JG

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers:
1. Vulcraft Steel Joist
- B. Open Web Joists Members: SJI Type K. LH Longspan. DLH Deep Longspan. Joist Girders.
- C. Nuts: ASTM A563 heavy hex type.
- D. Washers: ASTM F436; Type 1

- E. Structural Steel For Supplementary Framing and Joist Leg Extensions: ASTM A36/A36M.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

2.2 FABRICATION

- A. Furnish bottom and top chord extensions as indicated on drawings.
- B. Fabricate to achieve end bearing of:
 - 1. 2-1/2 inches on steel.
 - 2. 4 inches on masonry.
- C. Drill holes in chords necessary for attachment of wood nailers.

2.3 FINISH

- A. Shop prime joists and supplementary framing members. Do not prime surfaces that will be fireproofed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

3.2 ERECTION

- A. Erect and bear joists on supports.
- B. Allow for erection loads. Install sufficient temporary bracing to maintain framing safe, plumb, and in alignment.
- C. Coordinate placement of anchors in concrete or masonry construction for securing bearing plates and angles.
- D. After joist alignment and installation of framing, field weld joist seat to bearing plates or angles.
- E. Position and field weld joist chord extensions and wall attachments.
- F. Frame openings greater than 18 inches with supplementary framing.

- G. Do not permit erection of decking until joists are bridged, and secured or until completion of erection and installation of permanent bridging and bracing.
- H. Do not field cut or alter structural members without approval of Architect/Engineer.
- I. After erection, prime welds, abrasions, and surfaces not shop primed

3.3 ERECTION TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: ¼ inch.
- C. Maximum Offset From Alignment: 1/4 inch.

3.4 FIELD QUALITY CONTROL

- A. Field inspect members, connections, welds, and tightening of high strength bolts in slip-critical connections.

END OF SECTION

SECTION 05312

STEEL ROOF DECK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel roof deck and accessories.
 - 2. Bearing plates and angles.
- B. Related Sections:
 - 1. Section 03300 - Cast-in-Place Concrete: Concrete topping over metal roof deck.
 - 2. Section 05120 - Structural Steel: Support framing for deck openings.
 - 3. Section 05210 - Steel Joists: Support framing for deck openings.

1.2 REFERENCES

- A. American Society of Civil Engineers:
 - 1. ASCE 3 - Standard Practice for the Construction and Inspection of Composite Slabs.
- B. ASTM International:
 - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - 4. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- C. American Welding Society:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
- D. Steel Deck Institute:
 - 1. SDI 29 - Design Manual for Composite Decks, Form Decks and Roof Decks.
- E. SSPC: The Society for Protective Coatings:
 - 1. SSPC Paint 15 - Steel Joist Shop Paint.

1.3 PERFORMANCE REQUIREMENTS

- A. Design metal deck in accordance with SDI 29 Design Manual and ASCE 3.

- B. Calculate to structural working stress design and maximum vertical deck deflection of 1/240.

1.4 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate deck plan, support locations, Projections, openings and reinforcement, pertinent details, and accessories.
- C. Product Data: Submit deck profile characteristics and dimensions, structural properties, and finishes
- D. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ASCE 3 for composite decks.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Cut plastic wrap to encourage ventilation.
- C. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Sheet Steel: ASTM A653, Grade 33 Structural Quality; with G115 galvanized coating conforming to ASTM A525.
- B. Welding Materials: AWS D1.1.

2.2 FABRICATION

- A. Metal Deck: Sheet steel, configured as follows:
 - 1. Span Design: multiple
 - 2. Minimum Metal Thickness Excluding Finish: 22 gage.
 - 3. Minimum Allowable Diaphragm Shear: 250 plf.
 - 4. Nominal Height: 1-1/2 inch
 - 5. Side Joints: lapped

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

- A. Erect metal deck in accordance with SDI Manual.
- B. Bear deck on masonry or concrete support surfaces with 4 inch minimum bearing. Align and level.
- C. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.
- D. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.
- E. Install wet concrete stops at roof edge upturned to top surface of slab to contain wet concrete. Install stops of sufficient strength to remain stationary under wet concrete without distortion.
- F. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.
- G. Position roof sump pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- H. Place metal cant strips in position and mechanically attach.
- I. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

3.3 FIELD QUALITY CONTROL

- A. Welding: Inspect welds in accordance with AWS D1.1.

END OF SECTION

SECTION 06001

CARPENTRY WORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Rough carpentry; finish carpentry and cabinetwork. Custom work such as cabinetry and student storage shelving in the classroom is to be clad completely in plastic laminate: colors as selected by Architect. Other areas, such as book storage, are to be exposed wood.

1.02 QUALITY ASSURANCE

- A. Rough carpentry lumber: Visible grade stamp, of agency certified by National Forest Products Association (NFPA).
- B. Fabricate cabinetwork and site made finish carpentry items in accordance with recommendations of Quality Standards of Architectural Woodwork Institute (AWI).
- C. All framing and finish lumber shall be kiln-dried. Maximum moisture content for framing lumber shall be 15%, for finish lumber 12% and for board lumber 15%.

1.03 REFERENCE STANDARDS

- A. MIL-V-13518C Wood preservative: tetrachlorophenol and pentachlorophenol, surface sealing compound.
- B. PS 1-Construction and Industrial Plywood.
- C. PS 20-American Softwood lumber standard.
- D. PS 51-Hardwood and decorative plywood.
- E. PS 58-Basic hardwood.
- F. NFPA National Forest Products Association National design specification for wood construction

1.04 SUBMITTALS

- A. Submit shop drawings of cabinets.
- B. Submit samples of standard colors and patterns of plastic laminate for Architects selection.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver shop fabricated carpentry items until site conditions are adequate to receive the work. Protect items from weather while in transit.
- B. Store indoors, in ventilated areas with a constant minimum temperature of 60 degrees F (16 degrees C), maximum relative humidity of 22 to 55 percent.

PART 2 PRODUCTS

2.01 FRAMING LUMBER

- A. Framing, top and sole plates, fir, pine or spruce.
- B. Studs: stud grade and better southern yellow pine or stud grade and better Douglas Fir (West Coast) and stud grade and better spruce.
- C. Blocking Southern yellow pine or Douglas Fir (West Coast) utility grade.
- D. Bolts, nuts, washers, lags pins and screws: medium carbon steel: sized to suit application galvanized for exterior location, high humidity locations and treated wood: plain finish for other interior locations.
- E. Fasteners: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

- F. Miscellaneous fasteners:
 - 1. H-clips, aluminum, TECO or equal.
 - 2. Hurricane clips, 1 gauge steel, TECO U-grip type A-28 or equal.
 - 3. Joint hangers, 18 gauge steel, TECO strap ties, 1 3/8" length as required.
- G. Preservative treatment
 - 1. Framing lumber: all framing lumber required to receive a preservative treatment shall be treated in accordance with the specifications of AWPI Standards for softwood lumber. Lumber shall be treated by a pressure method (full or empty cell process) in accordance with AWPI LP-2, LP-3, or LP-
 - 2. Each piece of lumber shall be labeled with a permanent mark indicating conformance with the applicable AWPI standards.

2.02 FABRICATION

- A. Fabricate cabinetwork and finish carpentry items in accordance with recommendation of AWI and to extent indicate in schedule located at the end of this section. Shop fabricate items where possible.
- B. Fit shelves, and exposed edges with matching hardwood edging. Use full-length pieces only. All shelving units that are not completely clad in plastic laminate shall have plywood backs and sides.
- C. Cap exposed plastic laminate edges with material of same finish and pattern
- D. Shop assemble cabinetwork and finish carpentry items for delivery to site in sizes easily handled and to ensure passage through building openings.
- E. Use exposed fastening devices or nails only when unavoidable.

2.03 PREPERATION OF FINISH CARPENTRY ITEMS AND CABINETWORK FOR FINISHING

- A. Sand work smooth and set exposed nails. Apply wood filler in exposed nail and screw indention and leave ready to receive site applied finishes on items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
- B. Paint concealed and semi-concealed surfaces. Brush apply only.
- C. Seal internal surfaces of cabinets with 2 coats of shellac. Brush apply only.
- D. Preservative treat surfaces in contact with cementitious materials.
- E. Provide cutouts for plumbing fixtures, inserts, outlet boxes, and other fixtures and figments. Verify locations of cutouts from site dimensions. Seal contact surfaces of cutouts.

PART 3 EXECUTION

3.01 INSTALLATION OF FINISH CARPENTRY ITEMS AND CABINET WORK

- A. Set and secure cabinetwork and finish carpentry items in place, rigid, plumb, and square.
- B. Use purpose designed fixture attachments for mounted components.
- C. Threaded steel concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- D. When necessary to cut and fit on site, make material with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Permanently fix cabinet and counter bases to floor using appropriate angles.
- F. Counter-sink semi-concealed anchorage devices used to wall mount components and conceal with solid plugs of species to match surrounding wood. Place flush with surrounding surfaces.
- G. Carefully scribe cabinetwork which is against other building materials, leave gaps of 1/32 inch additional overlay trim for this purpose.
- H. Install and adjust cabinet hardware to correct operation.

- I. Install hardware, fixtures and accessories, provided under other sections for installations. Install items in accordance with manufacturer's recommendations.
- J. Ensure that mechanical and electrical items affecting this section of work are properly placed and have been inspected by the Architect/Engineer prior to commencement of installation.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. All rough carpentry items including, but not limited to:
 - 1. Wood blocking for support of items supported on or recessed into wood framing or requiring wood blocking for support.
 - 2. Wood cants, nailers, curbs, and other items associated with roofing work.
 - 3. Miscellaneous framing items and plywood sheathing.

1.2 RELATED WORK

- A. All Sections of Work supported on or recessed into wood framing or requiring wood blocking for support, such as wall trim, wall cabinets, handrails, lockers, toilet compartments, toilet and bath accessories, markerboards, tackboards, projection screens, fire extinguisher cabinets, etc., as applicable to the Project.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data on wood treatment materials.

1.4 STANDARDS AND GRADING

- A. All lumber used structurally shall be graded and marked with grade and trademark of a lumber grading organization approved by the Architect, except that a certification of grade from such a grading organization may be accepted in lieu of grade and trademarks when approved by Architect. Trademark of manufacturer shall also appear on each piece.
- B. Each piece of plywood used structurally shall carry the American Plywood Association trademark. The moisture content of lumber shall not be more than 15 percent.
- C. Grading Rules: Conform with all applicable requirements of American Lumber Standards "Simplified Practice Recommendations R-16" and to grading rules of manufacturer's association under whose rules the lumber is produced.
- D. Reference Standards: Conform with all requirements.
 - 1. U.S. Dept. of Commerce Product Standards (PS)
 - 2. American Plywood Association (APA)
 - a. Standards and Construction Guide
 - 3. American Wood Preserves Association (AWPA)
 - a. Standards, and they apply.
 - 4. Architectural Woodwork Institute (AWI)
 - a. "Quality Standards"
 - 5. National Woodwork Manufacturers' Association (NWMA)
 - a. Standards
 - 6. Western Wood Products Association (WWPA)
 - a. Manual

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Lumber:
 - 1. Treated No. 2, S4S Southern Yellow Pine, #1 kiln dried.
 - a. Comply with NWMA Standards
 - b. Use for blocking, stripping, grounds, cants and miscellaneous wood items in contact with concrete, roofing, or exposed to the weather.
- B. Plywood:
 - 1. General: Comply with APA Standards.
 - 2. APA A-D, Group 1 Interior used where appearance of only one side is exposed to view for interior locations. Use for wall liner at MDF/IDF closets and telephone boards in mechanical and telephone rooms where shown or required. 3/4 inch thick unless required or shown otherwise. Paint as scheduled in Section 09900.
 - 3. Exterior plywood, Group 1, Structural I-CC-EXT-APA rated sheathing. Use where miscellaneous plywood is exposed to concrete, weather, or at roof construction as sheathing.
 - 4. Fire Retardant Treated Plywood: Refer to Fire Retardant Treatment below. Use when required by building code or noted on drawings.
 - 5. Underlayment: If shown or required, APA rated Sturdi-floor, exterior grade, tongue and groove edges.
- C. Rough Hardware:
 - 1. Nails, Spikes, and Staples: Galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations: Size and type to suit applications. Do not use to resist “pull-out” loads.
 - 2. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application. Galvanize for exterior locations, high humidity locations, and treated wood. Plain finish for other interior locations.
 - 3. Fasteners: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry and concrete. Bolts or power activated type for anchorage to steel.
- D. Wood Treatment:
 - 1. Preservative Treatment (Concealed Conditions):
 - a. Micronized Copper Quaternary (MCQ): Pressure impregnate preservative to net retention of 0.15 lbs./cu.ft., in plant licensed by manufacturer.
 - b. Provide Quality Mark Stamp or end tag identifying third party inspection agency on treated wood for identification.
 - c. 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 wood.
 - d. ACQ and CCA preservatives not permitted.
 - e. Acceptable Manufacturers: Osmose “MicroPro” Smart Sense; or Architect approved equal.
 - 2. Fire Retardant Treatment:
 - a. Lumber shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard

accordance with AWP Standard C20.

- b. Plywood shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All Plywood must be dried following treatment in accordance with AWP Standard C27.

PART 3 – EXECUTION

- A. Wood Framing:
 - 1. Framing and blocking shall be accurately cut and fitted true to line and levels, avoiding shims and wedges.
 - 2. Spiking and nailing shall be done using largest size spikes and nail practicable.
 - 3. Unless otherwise shown, use 2 inch by 4 inch wood studs spaced 16 inches o.c. with 4 inch face perpendicular to direction of wall or partition. Provide single bottom plate and double-top plates 2 inches thick by width of studs.
 - 4. Bolt nailers and blocking to steel, masonry or concrete members with bolts or proportionate strength of members attached from each end, except as otherwise noted on plans.
 - 5. Provide blocking, bucks and framing as necessary and for other trades as required.
 - 6. Drill lumber accurately for bolts and fit all bolts with suitable washers.
- B. Plywood:
 - 1. Install plywood over framing in accordance with instruction of American Plywood Association Construction Guide Form No. E30C.
 - 2. Install underlayment plywood as shown in accordance with instructions of American Plywood Association. Space panel joints and edges 1/32 inch. Fill and sand panel edge joints, surface roughness, and damaged or open areas. Nail with 4d ring-shank nails spaced at six (6) inches at edges and eight (8) inches in field each way.

END OF SECTION

SECTION 06112

Rough Carpentry

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes structural floor, wall, and roof framing; built-up structural beams and columns; diaphragm trusses fabricated on site; floor, wall, and roof sheathing; preservative treatment of wood; fire retardant treatment of wood; miscellaneous framing and sheathing.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A135.4 - Basic Hardboard.
 - 2. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. American Wood-Preservers' Association:
 - 1. AWWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- C. ASTM International:
 - 1. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 2. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing.
 - 3. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
 - 4. ASTM D5456 - Standard Specification for Evaluation of Structural Composite Lumber Products.
 - 5. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
 - 6. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 7. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 8. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- D. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.

- E. U. S Department of Commerce National Institute of Standards and Technology:
 - 1. DOC PS 1 - Construction and Industrial Plywood.
 - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
 - 3. DOC PS 20 - American Softwood Lumber Standard.
- F. National Lumber Grades Authority:
 - 1. NLGA - Standard Grading Rules for Canadian Lumber.
- G. Northeastern Lumber Manufacturers Association:
 - 1. NELMA - Standard Grading Rules for Northeastern Lumber.
- H. The Redwood Inspection Service:
 - 1. RIS - Standard Specifications for Grades of California Redwood Lumber.
- I. Southern Pine Inspection Bureau:
 - 1. SPIB - Standard Grading Rules for Southern Pine Lumber.
- J. Underwriters Laboratories Inc.:
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- K. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- L. Western Wood Products Association:
 - 1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings For Site Fabricated Truss Frame: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.
- C. Product Data: Submit technical data on insulated sheathing, wood preservative materials, and application instructions.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 2. Wood Structural Panel Grading Agency: Certified by EWA - The Engineered Wood Association.
 - 3. Lumber: DOC PS 20.
 - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 - Product Requirements: Product storage and handling requirements.
- B. Protect trusses from warping or other distortion by stacking in vertical position, braced to resist movement.

PART 2 PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: American Softwood Lumber Standard DOC PS 20
- B. Beam Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.
- C. Joist Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.
- D. Rafter Framing: SPF species, No. 2 grade, 19 percent maximum moisture content.

2.2 SHEATHING MATERIALS

- A. Wood Structural Panel Roof Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24; Exposure Durability 1 or Exterior
- B. Wood Structural Panel Wall Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24; Exposure Durability 1 or Exterior
- C. Wood Structural Panel Floor Sheathing: EWA Rated Sheathing, Structural I, Plywood, Span Rating 48/24

2.3 UNDERLAYMENT MATERIALS

- A. Plywood Underlayment: EWA Structural I

2.4 SHEATHING AND UNDERLAYMENT LOCATIONS

- A. Sloped Roof Sheathing: 5/8 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, square edges.
- B. Flat Roof Sheathing: 5/8 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, square edges.
- C. Floor Sheathing: 3/4 inch thick, Span Rating 48/24, 48 x 96 inch sized sheets, tongue and groove edges.

2.5 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - 2. Nails and Staples: ASTM F1667.
- B. Structural Framing Connectors: Hot dipped galvanized steel, sized to suit framing conditions, manufactured by Simpson Strong Tie or equivalent.

2.6 FACTORY WOOD TREATMENT

- A. Wood Preservative (Pressure Treatment): AWP Treatment C1 using water borne preservative with 0.25 percent retainage.
- B. Moisture Content After Treatment:
 - 1. Lumber: Maximum 19 percent.
 - 2. Structural Panels: Maximum 15 percent.

PART 3 EXECUTION

3.1 FRAMING

- A. Set structural members level and plumb, in correct position.
- B. Fasten framing in accordance with applicable code.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members, crown side up.
- E. Construct load bearing framing members full length without splices.
- F. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.
- G. Construct double joist headers at floor and ceiling openings and under wall stud partitions parallel to floor joists. Frame rigidly into joists.
- H. Bridge framing in excess of 8 feet in span at mid-span. Fit solid blocking at ends of members.

- I. Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and wood “I” joists.

3.2 SHEATHING

- A. Fasten sheathing in accordance with applicable code.
- B. Secure roof sheathing with longer edge (strength axis) perpendicular to framing members and with ends staggered and sheet ends over bearing.
- C. Use sheathing clips between sheets between roof framing members.
- D. Secure wall sheathing with long dimension parallel to wall studs, with ends over firm bearing.

3.3 FIREBLOCKING AND DRAFTSTOPPING

- A. Install fireblocking to cut off concealed draft openings.
 - 1. Concealed Framed Wall and Furred Spaces: Install fireblocking vertically at floor and ceiling levels and horizontally at maximum 10 feet on center.
 - 2. Connections Between Horizontal and Vertical Spaces: Install fireblocking between vertical walls and partitions and the following:
 - a. Horizontal floor and roof framing.
 - b. Soffits, dropped ceilings, cove ceilings and other horizontal concealed spaces.
 - 3. Stairs: Install fireblocking between stair stringers at top and bottom of each run.

3.4 TOLERANCES

- A. Section 01400 - Quality Requirements: Tolerances.
- B. Framing Members: 1/4 inch from indicated position, maximum.
- C. Surface Flatness of Floor: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

END OF SECTION

SECTION 06114

WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Treated (Wolmanized) roof and cants.
- B. Fire retardant blocking in wall and roof openings.
- C. Wood furring and grounds.
- D. Concealed fire retardant wood blocking for support of toilet and bath accessories and cabinets.

1.02 RELATED SECTIONS

- A. Section 06410-Custom Casework: Casework.
- B. Section 07514-Built-Up asphalt Roofing: BUILT-UP Roofing to receive wood curbs and cants.

1.03 REFERENCES

- A. ALSC-American Lumber Standards Committee: Softwood Lumber Standards.
- B. APA: American Plywood Association.
- C. AWWA (American wood Preservers Association) C20-Structural Lumber Fire Retardant Treatment by Pressure Process.
- D. NFPA: National Forest Products Associations.
- E. RIS: National Forest Products Associations.
- F. SPIB: Southern Pine Inspection Bureau.
- G. WCLIB: West Coast Lumber Inspection Bureau.
- H. WWPAA: Western Wood Products Association.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide technical data on wood preservative materials and application instruction.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with the following Agencies:
 - 1. Lumber Grading Rules: NFPA.
 - 2. Plywood Grading Agency: Certified by APA.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber Grading Rules: NFPA.
- B. Plywood: APA Rated Sheathing Structural I, D-D; Exposure Durability 1; sanded and unsanded.

2.02 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
 - 2. Anchors: Toggle bolt type for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt or ballistic fastener for anchorage to steel.

2.03 FACTORY WOOD TREATMENT

- A. Fire retardant: AWPA Treatment C20, Exterior Type, Chemically treated and pressure impregnated.
- B. Wood Preservative (Pressure Treatment): AWPA Treatment C1 using Water borne preservative with 0.25 percent retainage.
- C. Wood preservative (Surface Application): L Clear Type.

PART 3 EXECUTION

3.01 FRAMING

- A. Set member level and plumb, in correct position.
- B. Place horizontal members flat, crown side up.
- C. Construction curb members of single pieces.
- D. Space framing and furring 16 inches o.c.
- E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- F. Coordinating installation of decking and support of deck openings, parapet construction, and roofing expansion joints.

3.02 ROOF CARPENTRY

- A. Roof edge: Mechanically attach wood blocking. Offset blocking layers twelve inches; weave corners. Fasteners shall be installed in two rows staggered. Spacing in any one row shall not exceed 24 inches o.c. within eight feet of outside corners, spacing shall not exceed 12 inch in any one row.
- B. Base Flashing: Mechanically attached wood blocking flashing base. Offset blocking layers twelve inches; weave corners. Flashing shall be installed if two rows staggered. Spacing in any two rows shall not exceed 24 inches o.c. within eight feet of outside corners, spacing shall not exceed 12 inches in any one row. Install 45 degrees and continuous wood cants at intersections of horizontal wood blocking and vertical flashing surfaces. Fasteners shall be installed in two rows staggered. Spacing in any row shall not exceed 12 inches in any one row. Miter corners blocking layers 12 inches; wave corners.

3.03 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coat of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashing and expansion joint. Treat site-sawn cuts
- C. Allow preservative to dry prior to erecting members.

3.04 SCHEDULES

- A. Roofing blocking S/P/F species, 19 percent maximum moisture content, pressure preservative treatment.

END OF SECTION

SECTION 06150

Wood Decking

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes [softwood lumber] [plywood] [glue laminated] structural wood decking and preservative treatment of wood.

1.2 REFERENCES

- A. APA/Engineered Wood Association:
 - 1. APA -Rated Sheathing.
- B. American Wood Preservers Association:
 - 1. AWPAC C1 -All Timber Products Preservative Treatment by Pressure Process.
 - 2. AWPAC C20 -Structural Lumber Fire Retardant Treatment by Pressure Process.

1.3 SYSTEM DESCRIPTION

- A. Design roof live and dead load: LL= 20 psf and DL= 10 psf with deflection limited to 1/240 32/16 of span.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 2. Wood Structural Panel Grading Agency: Certified by EWA -The Engineered Wood Association.
 - 3. Lumber: DOC PS 20.
 - 4. Wood Structural Panels: DOC PS 1

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and certified by AITC.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 - 1. Georgia Pacific Corp.
 - 2. Louisiana-Pacific Corp.

2.2 MATERIALS

- A. Plywood: APA/EWA[Rated Sheathing , Span Rating 32/16

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify support framing is ready to receive decking.

3.2 PREPARATION

- A. Coordinate placement of bearing items.

3.3 INSTALLATION -PLYWOOD DECKING

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Engage plywood tongue and groove edges.
- C. Allow expansion space at edges and ends.
- D. Attach decking with 8d nails.
- E. Use sheathing clips at unsupported edges of plywood between supporting framing members.
- F. Cut decking to accommodate roof drain and flange.

END OF SECTION

Linn-San Manuel Emergency
Service Facility Precinct No.4
Linn-San Manuel, Texas

Wood Decking
06150

Chanin Engineering, LLC

SECTION 06173

WOOD TRUSSES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes shop fabricated wood trusses for roof and floor framing; bridging, bracing, and anchorage; and preservative treatment of wood.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. APA-The Engineered Wood Association:
 - 1. APA/EWA TB 200 - Fire Retardant Treated Plywood.
- C. American Wood-Preservers' Association:
 - 1. AWWPA C1 - All Timber Products - Preservative Treatment by Pressure Process.
 - 2. AWWPA C20 - Structural Lumber - Fire-Retardant Treatment by Pressure Processes.
- D. ASTM International:
 - 1. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- E. National Fire Protection Association:
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- F. The Redwood Inspection Service:
 - 1. RIS - Standard Specifications for Grades of California Redwood Lumber.
- G. Southern Pine Inspection Bureau:
 - 1. SPIB - Standard Grading Rules for Southern Pine Lumber.

- H. Truss Plate Institute:
 - 1. TPI 1 - National Design Standard for Metal Plate Connected Wood Truss Construction.
- I. Underwriters Laboratories Inc.:
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- J. U. S Department of Commerce National Institute of Standards and Technology:
 - 1. DOC PS 1 - Construction and Industrial Plywood.
 - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
 - 3. DOC PS 20 - American Softwood Lumber Standard.
- K. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- L. Western Wood Products Association:
 - 1. WWPA G-5 - Western Lumber Grading Rules.

1.3 SYSTEM DESCRIPTION

- A. Design Floor Live and Dead Load: as indicated on drawings with deflection limited to 1/360 of span.
- B. Design Roof Live and Dead Load: as indicated on drawings with deflection limited to 1/240 of span including ceiling load.

1.4 SUBMITTALS

- A. Section {01330 - Submittal Procedures}: Submittal procedures.
- B. Shop Drawings: Indicate sizes and spacing of trusses and associated components, web and chord sizes, plate sizes, fastener descriptions and spacings, loads and truss cambers, framed openings, and end reactions. Submit design calculations.
- C. Product Data: Submit truss configurations, bearing and anchor details, bridging and bracing.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. Lumber Grading Agency: Certified by DOC PS 20.
 - 2. Plywood Grading Agency: Certified by APA/EWA.
 - 3. Lumber: DOC PS 20.
 - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

- B. Truss Design, Fabrication, and Installation: In accordance with TPI 1.
- C. Fire Rated Floor and Roof Construction: Rating as indicated on Architectural Drawings.
 - 1. Tested Rating: Determined in accordance with ASTM E119.
- D. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Design trusses under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Texas.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section {01600 - Product Requirements}: Product storage and handling requirements.
- B. Store truss depth in vertical position resting on intermittent bearing pads.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Lumber Grading Rules: SPIB

2.2 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.
- B. Fabricate bottom and top chord extensions as indicated on Drawings.
- C. Frame special sized openings in web framing as indicated on Drawings.

2.3 SOURCE QUALITY CONTROL

- A. Section {01400 - Quality Requirements}: Testing, inspection and analysis requirements.
- B. Inspect Work performed at fabricator's facility to verify conformance to Contract Documents.

- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop inspections are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section {01300 - Administrative Requirements}: Coordination and project conditions.
- B. Verify supports and openings are ready to receive trusses.

3.2 PREPARATION

- A. Coordinate placement of [bearing] [support] items.

3.3 ERECTION

- A. Set members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in alignment until completion of erection and installation of permanent bracing.
- C. Do not field cut or alter structural members without approval of Architect/Engineer.
- D. Place headers and supports to frame openings.
- E. Frame openings between trusses with lumber in accordance with Section [06112].] [[06114].
- F. Coordinate placement of sheathing with work of this Section.
- G. After erection, touch-up damaged surfaces with primer consistent with shop coat.

3.4 ERECTION TOLERANCES

- A. Section {01400 - Quality Requirements}: Tolerances.
- B. Framing Members: 1/2 inch maximum, from indicated position.

END OF SECTION

SECTION 06220

FINISH CARPENTRY AND MILLWORK

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Providing all finish carpentry items including, but not limited to:
 - 1. Finish Carpentry
 - 2. Millwork and Cabinetry
 - 3. Plastic Laminate
 - 4. Casework Hardware
 - 5. Miscellaneous Millwork
- B. Installation of:
 - 1. Finish hardware
 - 2. Plastic laminate faced wood doors

1.2 RELATED WORK

- A. Section 06100 – Rough Carpentry
- B. Section 08213 – Plastic Laminate Faced Wood Doors
- C. Section 08710 – Finish Hardware
- D. Section 09900 – Painting and Staining
- E. Section 12300 – Educational Casework

1.3 REFERENCES

- A. American National Standard Institute:
 - 1. ANSI A156.9 – Cabinet Hardware
 - 2. ANSI A161.1 – Woodwork Testing Standards
 - 3. ANSI A208.1 – Mat-Formed Wood Particleboard
- B. Architectural Woodwork Institute:
 - 1. AWI – Quality Standard Illustrated
- C. National Electrical Manufacturers Association:
 - 1. NEMA LD 3 – High Pressure Decorative Laminates

1.4 PERFORMANCE REQUIREMENTS

- A. Unless otherwise indicated, perform work in accordance with AWI “Quality Standards Illustrated”, Custom Grade, except where specification exceeds those standards, the more stringent shall govern.
- B. Fabricated millwork and cabinetry in accordance with ANSI A161.1, NEMA LD3, and

general static load testing performed and certified by an independent testing agency, covering the following areas of product performance, with these minimum results:

1. Base cabinet construction/racking test: 800 lbs.
2. Cabinet front joint loading test: 425 lbs.
3. Wall cabinet static load test: 2,000 lbs.
4. Drawer front joint loading test: 600 lbs.
5. Drawer construction/static load test: 750 lbs.
6. Cabinet adjustable shelf support device/static load test: 300 lbs.

- C. Shelf Loading: Comply with loading/deflection standards of the Composite Panel Association.

1.5 SUBMITTALS

- A. Product Data:
1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 2. Manufacturer's preprinted product information for all hardware proposed on the project.
 3. Manufacturer's preprinted maintenance instructions for the casework hardware.
- B. Shop Drawings:
1. Indicate size, material and finish.
 2. Show locations and installation procedures, including hardware, sinks, service fixtures, trim and other pertinent data for each unit.
- C. Certification: Provide manufacturer's certifications that casework has been fabricated and installed according to AWI "Custom" Grade guidelines or better.
- D. Samples: Two (2) each, 6 inch by 6 inch by 3/4 inch sample of specified particleboard core with grade stamp for use as verification of installed product.
- E. Closeout:
1. Record Drawings: indicate revisions to original drawings and shop drawings
 2. Manufacturer contact names, addresses and phone numbers
 3. Finish Material Schedule: names and color numbers of laminates and stains
 4. Keys: Provide additional master key for each room and additional locksets totaling one percent of total project for attic stock.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Minimum of five (5) years experience in providing manufactured casework systems for similar types of projects, produce evidence of financial stability, bonding capacity, and adequate facilities and personnel required to perform on this project.
- B. Delivery conference: 48 hours prior to delivery, notify Architect of delivery date and time. At the Architect's discretion, a representative of the Architect may be present at the time of delivery. Casework not conforming to the specified requirements, as reasonable determined by the Architect's representative, shall be removed and returned to manufacturer for repair or replacement at no additional cost to the Owner or increase in time.

1.7 PRE-INSTALLATION CONFERENCE

- A. Section 01110 – Notification of Architect Requirements.

1.8 PRODUCT HANDLING

- A. Deliver completed laminate clad casework, countertops and related products only after wet operations in building are completed. Store in ventilated place, protected from the weather, with relative humidity range of 20 to 50 percent.
- B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

1.9 JOB CONDITIONS

- A. Environmental Requirements: do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least one (1) week.
 - 1. Manufacturer/Supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
 - 2. After installation, control temperature and humidity to maintain relative humidity between 25 and 55 percent.
- B. Conditions: Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

1.10 COORDINATION

- A. Coordinate the Work of the Section with plumbing work specified in Division 15. Coordinate sink opening construction with sinks specified in Division 15.
- B. Coordinate location of blocking in walls for installation and support of wall cabinets.

1.11 WARRANTY

- A. Warranty the work specified herein for five (5) years against becoming unserviceable or causing and objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to the following:
 - 1. Rough or difficult operation, or loose or missing parts.
 - 2. Delamination of surfaces.
 - 3. Noticeable deterioration of finish.
 - 4. Warped or misaligned surfaces or telegraphing of subsurface imperfections.

PART 2 – WARRANTY

2.1 CASEWORK MANUFACTURERS

- A. Catalog numbers shown on drawings are based on Environments L44 Series manufactured by LSI Corporation of America, Inc. They are shown for reference only to indicate component requirements only. Fabrication of units shall be in accordance with these designations.

- B. Manufacturers listed below are certified by AWI Quality Certification Program and are listed for the Contractor's convenience only and shall not preclude the Contractor from using other manufacturers, provided they produce equivalent products of the type specified for the scope and size of the Project. Other manufacturers must have experience manufacturing products meeting or exceeding the specifications and must comply with the criteria specified in paragraph 1.7 above and with Division 1 requirements regarding substitutions.
1. Casework:
 - a. Calmar Manufacturing Co., Inc., Calmar, IA (563)562-3261
 - b. Case Systems, Inc., Midland, MI (989)496-9510
 - c. Casework Services, Inc. (CSI), Temple, TX (254)771-1419
 - d. Global Casework Manufacturing, Inc., Sugar Land, TX (281)494-6181
 - e. Imperial Mill & Fixture, Inc., Corpus Christi, TX (361)883-4630
 - f. LSI Corporation of America, Inc., Minneapolis, MN (763)559-4664
 - g. MGC Millwork, LP, Stafford, TX (281)340-1400
 - h. Robert Shaw Mfg. Co., Inc., Fort Worth, TX (817)927-2557
 - i. South Texas Woodmill, Inc., Brownsville, TX (956)831-3304
 - j. Stevens Industries, Inc., Teutopolis, IL (217)540-3100
 - k. Terrill Manufacturing Co., San Angelo, TX (915)655-7133
 - l. TMI Systems Design Corp., Dickenson, ND (701)225-6716
 - m. Victoria Cabinetworks, Victoria, TX (361)578-0263

2.2 MILLWORK MATERIALS

- A. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD3, and the following requirements:
1. Exterior Color Selection Available:
 - a. Architect to select from minimum of 250 selections available, including wood grain patterns and solid colors.
 - b. Provide 5 different colors available per project.
 - c. If laminate has wood grain, direction of grain shall be vertical on door, end panels, fascia panels, and exposed back; horizontal on drawer faces, aprons, and top rails.
 2. Laminate grades:
 - a. Exposed doors, finished end panels, and other vertical surfaces: GP28 (0.028 inch thick normal)
 - b. Horizontal surfaces other than top: GP28 (0.028 inch thick nominal)
 - c. Cabinet Liner: CL20 (0.020 inch nominal), white.
 - d. Work Surfaces and Countertops: GP50 (0.050 inch thick nominal) with BK20 (0.20 inch thick) backer sheet.
 - e. Backsplash: PH42 (0.042 inch nominal) with nominally balanced backer sheet.
 3. Adhesive: PVA water resistant adhesive. Contact adhesives not permitted.
 4. Pressure Fused Laminate:
 - a. NEMA LD3 VGL, and NEMA LD3 CLS, Melamine resin impregnated, 120 gram PSM minimum, thermofused to core under pressure.
 - b. Color:
 - 1) Closed interior, underside of wall cabinets: White.
 - 2) Exposed and Semi-exposed open cabinets: Match exterior.
 - c. Provide balanced construction with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.
- B. Core Material:
1. Particleboard: ANSI 208.1, minimum 45 pcf density, Grade M-3

2. Plywood: Shop sanded, exterior grade veneer cored, hardwood faced, any species, with no defects affecting strength or utility. Overlay plywood not permitted. Plywood allowed at countertops and toe-base only.
 3. Water resistant treated plywood: shall have 24 hour thickness swell factor of five percent or less and 24 hour water absorption factor of ten percent or less; P.S. 51, Type II or better.
 4. Cabinet components shall be of the following minimum core thicknesses:
 - a. Cabinet backs, drawer body, and drawer bottoms: 1/2 inch particleboard
 - b. Door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hangstrips, structural dividers, and exposed cabinet backs: 3/4 inch particleboard.
 - c. Work surfaces and countertops: minimum 1 inch particleboard or plywood, except use water resistant treated plywood core at counters with sinks.
 - d. Shelves: 3/4 inch particleboard core for 30 inches long or less, 1 inch thick particleboard core for more than 30 inches long; 14 inch deep, unless otherwise noted. Provide vertical dividers for shelves over 36 inches long.
 - e. Cabinet Toe-Base: 3/4 inch plywood. No particleboard within four (4) inches of floor.
- C. Countertops and Backsplashes:
1. Countertops: Provide countertops with PVC edge in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches either side of sink cutout.
 2. Backsplash: Integral to countertop, 4 inch high unless otherwise shown. Fabricate with single continuous sheet of laminate from front counter to top of splash with no joints from horizontal to vertical application. No joints shall occur at sink openings.
 3. At exposed countertop end corners, provide 1 inch radius, or similar safety treatment.
- D. Sinks: Refer to Division 15. Sizes as shown on drawings. Provide sealant at sink cut-outs.
- E. Service Fixtures: Refer to Division 15.
- F. Toe Spaces: Leave toe spaces unfinished for installation of resilient base, unless otherwise shown.
- G. End Panels and Filler Strips: Match adjacent case-piece.
- H. Edging:
1. Provide the following in accordance with "Edging Locations":
 - a. Flat Edge PVC: 0.020 inch. Solid, high-impact, purified, color-thru, acid resistant, machine-applied with hot melt adhesives.
 - b. 3 mm PVC: Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, and machine profiled to 1/8 inch radius.
 2. Edging Locations:
 - a. Cabinet body edge, including door/drawer front spacer rail: Flat Edge PVC, color matched to door/drawer face or as selected.
 - b. Forward edge of interior body components, interior dividers, self, and top

- edge of drawer body: Flat Edge PVC to match cabinet interior surface color.
- c. Door/Drawer-Front edging: 3mm PVC, color matched to standard laminates.

2.3 CABINET HARDWARE

- A. All hardware shall meet ANSI A156.9 and shall be subject to approval by the Architect. All keying shall match existing master key system and be approved by the Owner.
1. Acceptable Manufacturers:
 - a. Accuride
 - b. National
 - c. Knappe & Vogt
 - d. Ives
 - e. Stanley
 - f. As specified herein, provide specified product, or Architect approved equal.
- B. Hinges:
1. Heavy duty, five-knuckle 2 3/4 inch institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, Teflon coated tight pin feature with all edges eased. Hinge shall be full wrap around type of tempered steel 0.095 inch thick. Each hinge shall have minimum of 9 screws, #7, 5/8 inch FHMS to assure positive door attachment.
 2. One Pair per door to 48 inch height. One and one-half pair over 48 inches in height. Hinge shall accommodate 13/16 inch laminated door and allow 270 degree swing.
 3. Acceptable Product/Manufacturer: Institutional Hinge No. 100742, Dull Chrome (Cabinetmakers Hardware, 2002, Volume 6B), or approved equal.
- C. Pulls:
1. Wire design, 4 inches, Chrome, US26D finish.
- D. Sliding Door Hardware:
1. Frameless 1/4 inch glass sliding doors: double track rolling door assembly.
 2. Framed 13/16 inch thick stile and rail sliding doors: top mounted track with dual roller hangers. Vertical adjustment for accurate alignment.
- E. Drawer Slides:
1. Standard Drawers: 3/4 extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 100 pound dynamic load rating at full extension.
 2. File Drawers: Full extension, 3-part progressive opening slide, precision steel ball bearing, minimum 100 pound dynamic load rating at full extension, zinc plated or epoxy coated at manufacturer's option.
 3. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number. Cutting or machining of drawer body/face not permitted.
 4. Paper Storage Drawers: Full extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 150 pound dynamic load rating at full extension.
- F. Catches: Provide opening resistance in compliance with the American with Disabilities Act.

1. Provide top-mounted magnetic catch for base and wall cabinet door.
 2. Provide two at each tall cabinet door. Catch housing shall be molded in White.
- G. Adjustable Shelf Supports:
1. Dual-pin design with anti tip-up shelf restraints for both 3/4 inch and 1 inch shelves.
 2. Include Keel to retard shelf slide-off, and slot for mechanical attachment of shelf to clip.
 3. Load rating shall be minimum 300 pounds each support without failure.
- H. Wardrobe Rod: 1 inch diameter plated steel rod, with captive sockets.
- I. Coat Hooks: Single and double prong, wall mount – Satin Aluminum
- J. Locks: Five-disk tumbler cam-style with strike. Locks on cabinets in same room keyed alike. Provide two (2) keys per room where doors and drawers are scheduled to receive locks. Dull chrome finish. Lock core shall be removable with control key, permitting Owner to change lock arrangements without tools.

2.4 SPECIALTY ITEMS

- A. Grommets:
1. Size: 2-1/2 inches diameter with “Flip-Top”™ tap in cap.
 2. Colors: As selected by Architect from manufacturer’s available colors.
 3. Number/Location: Where electrical, telephone, and computer data wiring need to pass through tops whether shown or not.
 4. Approved Product/Manufacturer: Model No. EDP3 manufactured by Doug Mockett & Company, Inc., Manhattan Beach, CA (800)523-1269, or Architect approved equal.
- B. Keyboard Drawers (At all knee spaces):
1. Approved Product/Manufacturer: No. SD-1 as manufactured by Knappe & Vogt; or Architect approved equal.
- C. Molded Personal Pencil Drawer: High-impact 100 Polystyrene with in-stop, out-stop, and self-closing features. Provide under top mounted 100 ob self-closing slides. Twelve compartment drawer body, and slides, Black. Provide where indicated on plans.

2.5 SOLID STOCK

- A. Moisture Content: Percent of moisture in relation to over-dry weight shall be between 8 percent and 13 percent at time of installation.
- B. Natural Finish Hardwood:
1. Occasional Knot permitted provided it is tight and smooth.
 2. Grain Pattern: Rift-cut
 3. Species: AWI “Premium” Grade, White Oak
- C. Paint Grade Hardwood: Any species including Parana Pine, Except do not use Oak, Elm or similar species which have coarse grain.

2.6 MISCELLANEOUS

- A. Utility Shelving: AWI "Economy" grade.
- B. Clothes Rod: 1-1/2 inch diameter smooth wooden dowel by length required, with end supports and fasteners of type recommended to suit application.
- C. Telephone/MDF/IDF Board: Provide minimum 4 foot by 8 foot by 3/4 inch thick plywood for telephone/data punch down blocks and video equipment in accordance with Section 06100, Rough Carpentry. Paint in accordance with Section 09900, Painting.

2.7 MILLWORK FABRICATION

- A. Fabricate casework, countertops and related products to dimensions, profiles and details shown on drawings. Fabricate casework square, plumb, and true.
- B. Detailed Requirements For Cabinet Construction:
 - 1. Toe-Base:
 - a. Continuous, ladder type platform with concealed fastening to cabinet bottom, level and secured to floor
 - b. Toe-base at exposed cabinet end panels shall be recessed 1/4 inch from face of finished end, for flush installation of finished base material.
 - c. No cabinet sides-to-floor will be allowed.
 - 2. Cabinet Top and Bottom:
 - a. Solid sub-top shall be furnished for all base and tall cabinets.
 - b. At cabinets over 36 inches bottoms and tops shall be mechanically joined by a fixed divider.
 - c. Assembly devices shall be concealed on bottom side of wall cabinets.
 - 3. Cabinet Sides:
 - a. Doweled, and glued under pressure, or attached with fully concealed interlocking mechanical fasteners to sub-top and bottom.
 - b. Drill holes for adjustable shelves 1-1/4 inches on center.
 - 4. Cabinet Backs:
 - a. Side bound, captured in grooves, recessed from cabinet rear, and securely fastened at top and bottom.
 - b. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of two (2) at base, two (2) at wall, and three (3) at tall cabinets as instructed by casework manufacturer.
 - c. Provide removable back panels and closure panels for plumbing access at all sink cabinets, and where shown on drawings.
 - 5. Exposed end corner and face frame attachment:
 - a. Butt joint, glued and finish nailed; or attached with fully concealed interlocked mechanical fasteners.
 - 6. Door and Drawer Fronts:
 - a. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch reveal between multiple drawer fronts within the cabinet.
 - b. Where indicated, provide Stile and Rail doors with full 1/4 inch plate glass, hinged or sliding. Exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.
 - c. Where indicated, frameless sliding doors shall be 1/4 inch thick plate glass with ground and polished edges. Fit with anodized aluminum shoes and nylon roller.
- C. Drawers:
 - 1. Drawer fronts: apply to separate drawer body component sub-front.

2. Drawer sides: doweled to receive front and back, glued under pressure, machine squared.
 3. Drawer bottom: set into front and sides, 1/4 inch deep groove with minimum 3/8 inch standing shoulder, continuously glued. Reinforce drawer bottoms with 1/2 inch by 4 inch front-to-back intermediate underbody stiffeners, mechanically fastened. One at 24 inches, two at 36 inches, and over.
 4. Paper storage drawers: fitted with full width hood at back.
 5. Hanging file drawers shall be fabricated to accept letter size hanging folders compatible with Pendaflex system.
- D. Vertical and Horizontal Dividers: As required by manufacturer for type and style of component.
- E. Door/Drawer Front Rail: As Required by manufacturer for type and style of component, and hardware placement.
- F. ADA, Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA", or by General Note. Shall be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
1. Countertop height: With or without cabinet below, not to exceed a height of 34 inches Above Finished Floor (A.F.F.), at a surface depth of 24 inches.
 2. Kneespace clearance: minimum 29 inches A.F.F. at apron, and 30 inches clear span width.
 3. 12 inch deep shelving, adjustable or fixed: Not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.
 4. Wardrobe Cabinets: Provide with rod/shelf adjustable to 48 inches A.F.F. at a maximum 21 inch shelf depth.
 5. Sink Cabinet clearances: In addition to above, upper kneespace frontal depth shall be no less than 8 inches, and lower toe frontal depth shall be no less than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56, Section 4.19.

PART 3 – EXECUTION

3.1 MILLWORK INSTALLATION

- A. Positioning: Place approximately level, plumb and at right angles to adjacent work.
- B. Fitting: Where Field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging the products and adjacent work.
- C. Anchorage: Attach securely so the products will perform to their maximum ability without damage from inadequate fastenings.
- D. Fasten tops to frames with concealed clips, screws and glue.

3.2 FINISH HARDWARE INSTALLATION

- A. The supplier will mark each item of hardware for location. Protect the markings until each item is installed. If any item is delivered to the job not properly marked, return it to the supplier for marking before attempting to install it.
- B. Check markings on hardware for proper location. Install and make necessary

adjustments for proper working order. Any hardware damaged by improper adjustment or careless abuse will be replaced by the Contractor at his expense.

- C. Provide clean, properly sized and accurately placed mortises and drilled holes for all mortise hardware such as locksets and for cylindrical locks where specified only.
- D. Fit all surface-applied hardware accurately.
- E. After hardware is installed, protect exposed surfaces by use of heavy paper and masking tape and maintain until job completion.
- F. Remove all finish hardware except that which is primed for painting before painter's finish is applied. Permanently replace and re-adjust for proper function after painter's finish has dried hard.
- G. Millwork contractor shall be responsible for hardware on millwork.

3.3 PLASTIC LAMINATE FACED WOOD DOOR INSTALLATION

- A. Protect all doors during handling.
- B. Refer to Section 08710, Finish Hardware for hardware requirements.
- C. Install doors in accordance with manufacturer's instructions.
- D. Install and adjust doors for smooth, quite operation.

END OF SECTION

SECTION 07125

COPPER FABRIC BASE FLASHING

PART I GENERAL

1.01 SECTION INCLUDES

- A. Flexible flashing.

1.02 RELATED SECTIONS

- A. Section 04810- Unit Masonry Assemblies
- B. Section 04811- Single-Wythe Unit Masonry
- C. Section 04815- Cavity Walls
- D. Section 04816- Masonry Veneer
- E. Section 04820- Reinforced Unit Masonry Assemblies.
- F. Section 06100- Rough Carpentry: Flashings at windows, doors, and other openings.

1.03 REFERENCES

- A. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association.
- B. American Society for Testing and Materials
 - 1. ASTM E-8— Test method for tension testing of metallic materials
 - 2. ASTM D-412— Test method for tension and elongation
 - 3. ASTM E-154— Test method for puncture resistance of water vapor retarders
 - 4. ASTM D-1004— Test method for initial tear resistance of sheeting
 - 5. ASTM D-1938— Test method for tear propagation resistance by a single tear
 - 6. ASTM E-96-B— Test method for water vapor transmission of materials
 - 7. ASTM D-570— Test method for water absorption
 - 8. ASTM B-370-98— Standard specification for copper sheet and strip
 - 9. MIL-F-55561A— Military specification for copper sheeting
 - 10. ASTM-B-248— Specification for general requirements for copper alloy sheets

1.04 SUBMITTALS

- A. See Section 01300- Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Samples: Actual pieces of flashing materials specified, not less than 3 by 5 inches.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all flashing materials by a single manufacturer with not less than 20 years of experience in manufacturing products of the type specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, sealed packaging bearing manufacturer's name and product identification.
- B. Store flashing materials under cover avoiding twisting and deformation, in manufacturer's unopened packaging, until ready for installation.
- C. Store mastic materials in sealed containers that are protected from the weather.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: York Manufacturing, Inc; Sanford, Maine 04073.
Tel: 207-324-1300 or 800-551-2828, Fax: 888-819-2592, website
www.yorkmfg.com,
Email: info@yorkmfg.com
- B. Substitutions: Approved Equals

2.02 MATERIALS

- A. Flexible Flashing: Laminated sheet comprising of CDA 110 alloy copper sheet with O60 temper conforming to ASTM B-370-98 bonded with a ductile asphalt per ASTM 449-89 type II, Grade UC-20 in a quality of not less than 1.4 oz/sq ft, between two layers of glass fabric weighing not less than 0.3 oz/ sq ft/layer with 20 x 10 threads per inch. Mineral mica dust will be used as a parting agent.
 - 1. Performance Requirements: Tests performed on 5 ounce flashing
 - a. Tensile Strength: ASTM E 8— 32,000 psi
 - b. Elongation: ASTM D-412 die C— 50%
 - c. Puncture Resistance: ASTM E-154— 390# min
 - d. Tear Resistance-Initial: ASTM D-1004— 43.8# min
 - e. Tear Resistance-Propagation: ASTM D-1938— 22.2# min
 - f. Permeance: ASTM E-96-B— 0.00 perms
 - g. Water Absorption: ASTM D-570— PASS
 - 2. Product: YORK COPPER FABRIC Manufactured by York Manufacturing or approved equal

2.03 ACCESSORIES

- A. Flashing Mastic: A compounded composition of asphalt, mineral stabilizers and interfiber manufactured to a trowel grade consistency.
 - 1. Product: YORK COP-R-TITE MASTIC Manufactured by York Manufacturing
- B. Termination Bars: Stainless Steel, Aluminum or Plastic bars; 1" x 1/8" x 8' with holes every 8" starting 4" from either end.
- C. Weep Vents: Cell vents insure positive drainage in all cavity wall construction. Made from durable polypropylene, Weep Vents are available clear or gray in two sizes: 3/8" x 2 1/2" x 3 3/8" and 3/8" x 3 1/2" x 3 1/2"
 - 1. Product: YORK CELL VENTS Manufactured by York Manufacturing

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and sloped so that water will drain to building exterior.
- B. Verify that surfaces to receive flashing are thoroughly dry, free from loose materials, and reasonably smooth, with no projections or sharp edges that could puncture flashing.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and with applicable recommendations of SMACNA Architectural Sheet Metal Manual.
 - 1. Lap flashing joints minimum of 4 inches and seal watertight with mastic.
 - 2. Carry flashing vertically as detailed, but in no case less than 6 inches above horizontal flashing plane.
 - 3. Extend head and sill flashings not less than 6 inches beyond openings and turn up to from watertight pan; seal with mastic.

- B. Masonry Flashing: Comply with requirements of applicable Section(s)
- C. Masonry Flashing: Lay horizontal flashing in slurry of fresh mortar and top with fresh full bed or mortar to receive masonry units.
 - 1. Carry Flashing through wall and leave exposed for inspection.
 - 2. After Inspection and approval, cut flashing flush with surface of masonry or as otherwise detailed.
 - 3. Remove mortar or other obstructions from weep holes.

END OF SECTION

SECTION 07140
BELOW GRADE WATERPROOFING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Preparation of concrete surfaces to receive waterproofing membrane.
- B. Sealing of Cracks and joints.
- C. Fluid applied waterproofing system, with prefabricated drainage composite or protection board at elevator pit walls and at Auditorium walls that fall below grade.
- D. Pre-applied waterproofing system, with joint sealing tape, and other accessories at below grade horizontal surfaces under the slab or elevator pit.

1.2 RELATED SECTIONS

- A. Section 03300 – Cast-In-Place Concrete
- B. Section 07900 – Building Sealants
- C. Division 15 – Mechanical: Mechanical penetrations, such as floor drains and piping, through waterproofing membrane.
- D. Division 16 – Electrical: Electrical penetrations, such as conduit, through waterproofing membrane.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Certifications:
 - 1. Manufacturers certification that applicator is approved by manufacturer.
 - 2. Manufacturers affidavit that materials used in Project contain no asbestos.
- C. Warranty: Submit a sample warranty identifying the terms and conditions stated in warranty.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials and shall be specifically approved in writing by the membrane system manufacturer.
- B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and

laws regarding use and application of products that contain volatile organic compounds (VOC).

1.5 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials job site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with following information.
 - 1. Name of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Material safety data sheet (MSDS).
- B. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets (MSDS).
- C. Protect from damage from sunlight, weather, excessive temperature and construction operations.
- D. Remove damaged material from the site and dispose of in accordance with applicable regulations.
- E. Do not double-stack pallets of waterproofing on the job site. Provide cover on top and all sides.
- F. Store drainage composite and protection board flat and off the ground. Provide cover on top and all sides.
- G. Protect waterproofing materials from freezing. In cool temperatures, store the material for several hours at room temperature to facilitate mixing and application.
- H. Sequence deliveries of materials to avoid delays, but minimize on-site storage.

1.7 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive membrane waterproofing.
- C. Coordinate waterproofing work with other trades to ensure adequate illumination, ventilation, and dust-free environment during application and curing of membrane. The applicator shall have sole right of access to the specified areas for the time needed to complete the application and allow the membrane to cure adequately.
- D. Protect adjoining surfaces not to be coated against damage or soiling. Protect plants, vegetation and animals which might be affected by waterproofing operations.
- E. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.

- F. Keep products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.
- G. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.8 WARRANTY

- A. Warrant the work specified herein for two (2) years against becoming unserviceable or causing and objectionable appearance resulting from either defective or non-conforming materials and workmanship.

PART 2 – PRODUCTS

2.1 FLUID APPLIED WATERPROOFING SYSTEM

- A. Specifications are based on named manufacturer. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
 - 1. Carlisle Coatings and Waterproofing Incorporated, Sapulpa, OK (Barricoat)
 - 2. Grace Construction Products, W.R. Grace & Co.-Conn., Austin, TX
- B. Waterproofing Membrane: Two (2) part, self-curing, synthetic rubber based material meeting or exceeding the performance requirements of ASTM C836 and other ASTM standards as indicated in the following table and conforming to W.R. Grace & Co. "Procor" waterproofing membrane.

Waterproofing Membrane Physical Properties, minimum:

<u>Property</u>	<u>Test Method</u>	<u>Typical Value</u>
Cured Film Thickness:	ASTM D3767 Method A	1.5 mm (0.060 in.) nom.
Solids Content	ASTM D1644	100 percent
Flexibility, 180 degree Bend over 25 mm (1 in) Mandrel at 32 degrees C (-25 degrees F)	ASTM D1970	Unaffected
Elongation	ASTM D412	500 percent minimum
Peel Adhesion to Concrete	ASTM D903 Modified*	880 N/m (5 lbs./in.)

- C. Accessory Products:
 - 1. Prefabricated Drainage Composite: Shall be designed to promote positive drainage while serving as a protection course.
 - a. Hydroduct ® 660 Drainage Composite for use on all horizontal surfaces.
 - b. Hydroduct ® 220 Drainage Composite for use on all vertical surfaces.
 - 2. Protection Board (Use only where prefabricated drainage composite is not used):
 - a. Asphalt Hardboard: A pre-molded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm (0.125 inch) thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two (2) layers of 3 mm (0.125 inch) thick hardboard or one (1) layer of 6 mm (0.25 inch) thick hardboard.

- b. Expanded Polystyrene: 25 mm (1 inch) thick for vertical applications with the following characteristics:

Normal Density: 1.0 pcf³

Thermal Conductivity, K factor: 0.24 at 40 degrees F, 0.26 at 24 75 Degrees F

Thermal Resistance, R-Value: 4 per 1 inch of thickness.

- D. Locations: Vertical below-grade retaining walls and walls that fall below grade 0'-0" and where shown on drawings.

2.2 PRE-APPLIED WATERPROOFING SYSTEM

- A. Specifications are based on named manufacturer. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
 - 1. Carlisle Coatings and Waterproofing Incorporated, Sapulpa, OK
 - 2. Grace Construction Products, W.R. Grace & Co.-Conn., Austin, TX
- B. Waterproofing Membrane: Composite sheet comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating. Membrane provides a continuous seal that resists water ingress and migration between the membrane and the structure. The waterproofing system shall conform to the following products as manufactured by W.R. Grace & Co.:
 - 1. Membrane: Robust membrane for horizontal use below concrete slabs complying with Preprufe 200.
 - 2. Tape: Self-adhesive 8 inch wide strip applied to the surface of the membrane along the line of all concrete joints (application temperature range minus 25 degrees F to 86 degrees F). Product shall conform to Preprufe CJ Tape LT; or in hot climates (minimum 50 degrees F), use Preprufe CJ Tape HC.
 - 3. Sealing Membrane: For sealing around penetrations shall conform with Bituthene.
- C. Locations: Below grade horizontal surfaces under the slab, and where shown on drawings.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Before waterproofing work is started the all surfaces to be waterproofed shall be thoroughly examined for all deficiencies. Should deficiencies exit, the Architect shall be notified in writing and corrections made.

3.2 SURFACE PREPARATION

- A. Surfaces to which waterproofing is to be applied shall be thoroughly clean, dry and free from all surface contaminates or cleaning residue that may harmfully affect the adhesion of the membrane.
- B. Repair all cracks in accordance with manufacturer's instructions.

3.3 APPLICATION

- A. Priming: Shall be in accordance with membrane manufacturer's instructions.
- B. Apply waterproofing in accordance with membrane manufacturer's instructions.
- C. Liquid membrane waterproofing on vertical walls shall positive overlap turned up sheet membrane waterproofing from under slab as instructed by the manufacturer.
- D. Where shown or required, install specified perimeter drainage system as the first course of drainage composite immediately after membrane has cured on vertical surfaces. Install manufacturer's recommended drainage composite or protection board/protection course on remainder.

END OF SECTION

SECTION 07160
DAMPPROOFING ABOVE GRADE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Dampproofing applied to exterior face of all exterior sheathing and masonry back up walls for brick veneer exposed to the weather.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Certifications:
 - 1. Manufacturer's certification of compatibility with rigid insulation specified in Section 07210.
 - 2. Manufacturer's affidavit that materials used in Project contain no asbestos, lead, or PCB's.

1.3 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements

1.4 WARRANTY

- A. Warrant the work specified herein for two (2) full years/continuous without failure.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS/PRODUCTS

- A. Manufacturers listed below whose product meets or exceeds the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered. If other than the manufacturer listed as basis of specification is used, use their literature for specific installation requirements.
 - 1. Sonneborn (Hydrocide 700B by BASF Construction Chemicals), Shakopee, MN (800)433-9517
 - 2. Karnak (No. 220 AF), Clark, NJ (732)388-9422
 - 3. Henry Company, Houston, TX (800)231-4551
 - 4. W.R. Meadows, Inc. (Sealmastic Emulsion) Hampshire, IL (800)342-5976
- B. Specifications are based on Henry No. HE789 Fibered Ashalt Emulsion Dampproofing manufactured by Henry Company, Houston, TX

2.2 PRODUCT DESCRIPTION

- A. Type: Fibered Asphalt Emulsion Coating and Dampproofing.
- B. Use: Dampproofing on exterior sheathing in cavity wall construction and behind plaster, on masonry in cavity wall construction, and as an insulation adhesive.
- C. Composition and Materials: Asphaltic resin and clay colloidal emulsifiers.
- D. Limitations: Apply material when temperature is over 45 degrees F and protect from rain or freezing until completely dry. Do not apply where material will be in continuous contact with water on ponded water situations.

2.3 TECHNICAL DATA

- A. Henry company No. HE789:
 - 1. Permeability, perm-inch: 0.10
 - 2. Cured Film Properties:
 - a. Flammability: No flash
 - b. Firm set, hours, maximum (50 percent R.H., 70+ degrees F): 24
 - c. Heat test, 212 degrees: No blistering or sagging
 - d. Flexibility, @ 180 degrees F arc, 2 inch mandrel, @ 32 degrees F: No cracking
 - e. Resistance to water: No blistering, no re-emulsification after thorough curing
 - f. Direct flame test: No flame
 - 3. Compliance: ASTM D1227 Type II Class I, and ASTM D1187, Type I

2.4 MISCELLANEOUS MATERIALS

- A. 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 INSTALLATION

- A. Surface Preparation (Masonry): Dust, dirt, old loose or scaling coatings should be removed from the surface before coating. 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. 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. 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.
- B. Surface Preparation (Sheathing): Prep joints and penetrations in exterior sheathing per sheathing manufacturer's instructions.

- C. Working Conditions: Apply under normal working conditions above 45 degrees F and rising. Do not apply when rain is imminent.
- D. Application: 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 percent 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.
 - 1. Insure continuous coating free of breaks, voids and pinholes.
 - 2. Thoroughly cover all cracks, joints, and corners.
 - 3. Provide dampproofing 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 plaster.
- E. Coverage: Minimum 4 gallons per 100 square feet.
- F. Storage: Keep container tightly sealed and protect from freezing in shipping and storage.

3.2 TESTING AND INSPECTING

- A. 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-0 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 forces 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.
- B. If evidence of moisture penetration is discovered, apply an additional coat of approved water repellent 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.

END OF SECTION

SECTION 07175
SELF ADHERING ROOF UNDERLAYMENT

PART 1 – DESCRIPTION

- A. Provide all labor, materials, equipment, supervision and incidentals as needed to install a complete POLYGLASS® reinforced modified bituminous underlayment over a new or accepted, prepared existing roof substrate. All details of installation shall conform to POLYGLASS® Specifications, Details and General Recommendations.

QUALITY ASSURANCE

- A. Products used in the work of this Section shall be manufactured by POLYGLASS® or accepted for use in conjunction with the products manufactured by POLYGLASS®.
- B. The Roofing Contractor and his personnel shall be currently accepted by POLYGLASS® as qualified to install the materials of this section. Do not apply roofing during inclement weather. Do not apply roofing membrane to damp frozen, dirty or dusty surfaces.

PART 2 – MATERIALS

- A. Underlayment - POLYGLASS® Polystick MTS, A homogeneous rubberized asphalt waterproofing membrane, glass fiber reinforced designed specifically for use as a metal, mechanically attached tile, shingle underlayment. The bottom surface of the sheet has an adhesive compound with split release film for ease of application. TRADENAME: POLYSTICK MTS
- B. FINISHED ROOFING SURFACE - Metal, Tile or Shingles, Manufactured by Others.
- C. ASPHALT PRIMER - Meeting ASTM D 41 specification, applied in strict conformance to manufacturers recommendations.
- D. PRODUCT HANDLING
All materials, except those that are shop fabricated shall be delivered to the job site with their original labels intact. Bulk materials, shall be identified by the manufacturer as to specification issued. All materials shall be stored in accordance with the instructions of the manufacturer prior to their application or installation. No wet or damaged materials will be used in the application. Materials stored on the job site shall be a minimum 4" off the ground of the roof.

Application of all roofing shall be accomplished in such a way that each area will be complete at the end of each day's work. All roof edges and incomplete flashing shall be protected against water entry, particularly between work periods.

When ambient temperature is below 40 DEG. F, care must be exercised in handling and storing POLYGLASS® membrane. Only rolls for immediate application shall be exposed to the elements.

All masonry, concrete and sheet metal surfaces incorporated into the roof system shall be primed with asphalt primer meeting ASTM D-41 specification and allowed to dry prior to installing bituminous roofing materials.

Wood curbs or nailers, where required, shall be pressure treated with accepted pressure treatment meeting AWAP Standard P-5.

PART 3 – APPLICATION

A. INSTALLATION

Decks: Prime where required, in accordance with requirements and recommendations of the primer & deck manufacturer (if applicable). DensDecking must be primed No Less than two (2) times. Where a vapor retarder, slip or base sheet is required by the specifier: Follow the instructions with regard to the particular materials specified and install in accordance with the recommendations of the manufacturer and the requirements of the architect.

B. MEMBRANE

Cut and unroll the POLYSTICK MTS membrane to a suitable desired length (depending on conditions etc.). Position the material in the desired location on the substrate and proceed as follows; align the membrane at the lowest edge of the roof. Fold the material back onto itself (width wise) and remove the split back release paper from the exposed side, gradually push/roll the material into place (do not lift and drop the material into place, air pockets may occur that will be difficult to remove). Apply even pressure along the entire length of the membrane, from center to outer edges, to avoid air inclusions or wrinkles. Repeat for other side. Position the next sheet by overlapping seams to lineup the overlap of the top sheet edge with the inside of the bottom sheet. After adhering roll, it is recommended that uniform pressure be applied to the entire roll area by a weighted roller or water-filled lawn roller. Care must be taken during rolling on sloped roofs.

- C. The rolls of membrane shall be installed perpendicular to the slope of the roof, starting at the lowest point of application, wherever possible. Laps of sheets should be installed to shed water with the slope of the roof wherever practical. At any intersection between different roof slopes, narrow valleys or gutters (less than 3' wide) or similar details, install an additional ply of POLYSTICK MTS, extending minimum 3" onto each surface.

End of Section

SECTION 07210
BUILDING INSULATION

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Rigid board cavity wall insulation where shown on drawings or required.
- B. Batt insulation used for thermal and sound insulation in stud walls, above lay-in ceiling panels, and where shown on drawings or required.

1.2 RELATED WORK

- A. Section 07160 – Dampproofing Above Grade
- B. Section 07270 – Firestopping and Fire Safing
- C. Section 09510 – Acoustical Lay-In Ceiling: Installation of acoustical insulation above lay-in ceiling panels as specified.
- D. Division 15 – Mechanical: Duct insulation

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's literature on each insulation type specified.
 - 2. Manufacturer's installation instructions for each insulation type specified.
- B. Samples: Six (6) inch x six (6) inch piece of rigid insulation for Architect's approval.
- C. Certifications:
 - 1. Manufacturer's certification of compatibility of rigid insulation with dampproofing mastic.
 - 2. Manufacturers affidavit that materials used in Project contain no asbestos.

1.4 COORDINATION

- A. Furnish acoustical insulation to acoustical lay-in ceiling contractor for laying insulation above lay-in ceiling panel system specified.

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS/PRODUCTS

- A. Specifications are based on any of the manufacturers listed below, with their product in parenthesis for the particular insulation application. Other manufacturers not listed must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 regarding substitutions to be considered.

1. Rigid Wall Insulation:
 - a. Extruded Polystyrene Foam Board:
 - 1) Dow Chemical Co. (Styrofoam Cavitymate Plus)
 - 2) Owens-Corning (Foamular CW25)
 - 3) Pactiv Building Products (GreenGuard-SB)
2. Batt Thermal Insulation:
 - a. Walls: For use in partition thermal applications.
 - 1) CertainTeed Corp. (AcoustaTherm)
 - 2) Guardian Fiberglass, Inc. (Thermal & Sound Control Batts)
 - 3) Johns-Manville (Thermal-SHIELD Thermal Insulation)
 - 4) Knauf (QuietTherm Insulation)
 - 5) Owens-Corning (Thermal Batt Insulation)
3. Batt Acoustical Insulation (Sound Attenuation):
 - a. Walls/Ceilings: For use in partition acoustical applications and above lay-in ceilings as specified and where shown on drawings.
 - 1) CertainTeed Corp. (CertaPro AcoustaTherm)
 - 2) Guardian Fiberglass, Inc. (Thermal & Sound Control Batts)
 - 3) Johns-Manville (Sound-SHIELD Sound Control Batts)
 - 4) Knauf (QuietTherm Insulation)
 - 5) Owens-Corning (Above Ceiling – Sonobatts; Walls – Sound Batt)
 - 6) United States Gypsum Co. (Thermafiber Sound Attenuation Fire Blanket (SAFB) Insulation)
4. Safing Insulation: As specified in Section 07270, Fire Stopping and Fire Safing.

2.2 MATERIALS

- A. Rigid Wall Insulation: (In Exterior Cavity Walls)
 1. Extruded Polystyrene Foam Board:
 - a. Specification: ASTM C578, Type IV
 - b. Thermal Resistance: R=5.0 per inch minimum
 - c. Water Absorption (% by volume): 0.1 maximum
 - d. Water Vapor Permeance (perm): 1.1 per inch
 - e. Compressive Strength: 15 psi minimum
 - f. Thickness: 1-1/2 inches, unless shown otherwise
 - g. Size: 16 inch x 96 inch sheets
- B. Batt Insulation:
 1. Thermal Insulation:
 - a. Type: ASTM C665, Type 1, unfaced
 - b. Thickness/R-Values (minimum):
 - 1) 3-1/2 inches/R-11 where shown on drawings
 - 2) 6 inches/R-19 where shown on drawings
 - c. Surface Burning Characteristics:
 - 1) Flame Spread: 25 or less
 - 2) Smoke Developed: 50 or less
 2. Acoustical (Sound Attenuation) Insulation:
 - a. Type: ASTM C665, Type 1, unfaced
 - b. Surface Burning Characteristics:
 - 1) Flame Spread: 25 or less
 - 2) Smoke Developed: 50 or less
 - c. Thickness/R-Values (minimum):
 - 1) 3-1/2 inches/R-11 where shown on drawings
 - 2) 6 inches/R-19 above lay-in ceiling specified and where shown on drawings.

- C. Safing Insulation: As specified in Section 07270, Fire Stopping and Fire Safing.
- D. Miscellaneous Materials:
 - 1. Mechanical Fasteners: Impaling clip of [galvanized steel] with washer retainer and clips, to be adhered or mechanically fastened to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
 - 2. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 – EXECUTION

3.1 INSULATION

- A. Rigid Board Insulation:
 - 1. Install board insulation at exterior masonry walls in accordance with manufacturer's printed instructions.
 - 2. Cut insulation to fit snugly around obstructions such as vents, pipe or conduit.
 - 3. Install board insulation to back-up wall surface secured by veneer wall ties and mastic.
 - 4. Install board insulation with joints tight to veneer wall ties and to provide full coverage.
- B. Batt Insulation (Thermal and Sound):
 - 1. Walls:
 - a. Insulation shall be friction fit between studs and provide full coverage where indicated on drawings.
 - b. Insulation shall be tight within spaces in partitions, around cut openings, behind and around electrical and mechanical items within or behind partitions and tight to items passing through partitions.
 - c. Wall areas above ceiling: At side wall insulation in ceiling cavity, install adhesive-mounted impaling devices with metal caps at 2 feet-0 inches vertically and at four (4) inches from each side of blankets horizontally. Install blankets with four (4) foot dimension running vertically on spikes, keeping blankets tight to exterior wall without crushing into each other.
- C. Safing Insulation: As specified in Section 07270, Fire Stopping and Fire Safing.

END OF SECTION

SECTION 07220

ROOF AND DECK INSULATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work included rigid insulation to be installed over structural roof deck.
- B. Related Work Described Elsewhere: I. Building Insulation.

1.02 PRODUCT HANDLING

- A. Protection:
 - 1. Deliver materials to site; store in dry place with labels intact.
 - 2. Protect materials before, during, and after insulation.
 - 3. Protect installed work or other trades.
- B. Replacements in event of damage, make necessary repairs and replacements.

1.03 QUALITY ASSURANCE

- A. Qualifications: A single installer (roofer) shall perform the work of this section; and shall be firm with not less than five years of successful experience in installation of built-up roofing systems similar to those manufacturer of primary roofing materials.
- B. Shop Drawings: Submit in accordance with Section 01340 shop drawings on all tapered roof insulation systems, including edge strips and crickets as indicated on the drawings.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Insulation shall be the product indicated or an equal approved in advance by the Architect.
- B. Composite Insulation Board with the OSB Cover-board (Minimum Thickness 3.3 Polyiso, 3.8" total.)
 - 1. Firestone Roofing: HailGuard Composite Board
 - 2. Hunter Panels: H-Shield NB
 - 3. John's Manville: Nail Board
- C. Roof Deck Fasteners:
 - 1. As recommended by manufacturer.
- D. Roof Tape:
 - 1. As recommended by manufacturer.
- E. Other Materials: Adhesives, or other materials not specifically described shall be as recommended by the insulation manufacture for the substrate involved.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, inspected installed work and verify that the installation may properly commence.
 - 2. Verify that insulation may be installed in accordance with original design and manufacturer's recommendations.
- B. Discrepancies:
 - 1. In even of discrepancy, notify Architect.
 - 2. Do not proceed until discrepancies have been resolved.

3.02 INSTALLATION

- A. Coordinate this section with roof specifications.
- B. Set joints tape in hot steep asphalt at 15 lbs. Per 100 sq. ft.
- C. Do not leave insulation exposed to weather.
- D. Do not apply more insulation that can be covered with finished built-up roofing on the same day.
- E. Protect from exposure to fire during storage, transit, and installation.

3.03 INSPECTION

- A. Verify that insulation work is properly installed and complete.

END OF SECTION

SECTION 07270

FIRESTOPPING AND FIRE SAFING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Non-combustible firestopping and fire safing materials, and accessories as shown on drawings, or if not shown, as required, including, but not limited to the following:
 - 1. Intumescent Caulks, Elastomerics, Sealants, Compounds, Putties, Joint Sprays, Wrap Strips, and Coatings
 - 2. Silicone Sealants
 - 3. Mortar Materials (Cementitious)
 - 4. Firestopping Foam Materials
 - 5. Fire Block Materials
 - 6. Pillow Materials
 - 7. Mat Materials
 - 8. Cast-in-place Devices, Collars, and other materials, including fire/smoke stop systems, which meet the specified requirements.
- B. General description of the work in this section:
 - 1. Only tested firestop systems shall be used in specific locations as follows:
 - a. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 - b. Blank openings through fire-rated vertical barriers (wall and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 - c. Openings and penetrations in fire-rated partitions or walls containing fire doors.
 - d. Openings around structural members which penetrate floors or walls.

1.2 RELATED WORK

- A. Section 03300 – Cast-In-Place Concrete
- B. Section 04200 – Masonry
- C. Section 07210 – Building Insulation
- D. Section 07900 – Building Sealants
- E. Section 09100 – Lath and Plaster
- F. Section 09250 – Gypsum Wallboard Systems: Wallboard used for fire rated construction.
- G. Division 15 – Mechanical: Requirements for penetrations through fire rated construction.
- H. Division 16 – Electrical: Requirements for penetrations through fire rated construction.

1.3 REFERENCES

- A. ASTM International (ASTM)
 - 1. C665, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 2. E48, standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 4. E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - 5. E2174, Standard Practice for On-Site Inspection of Installed Fire Stops
- B. National Fire Protection Association (NFPA)
 - 1. 70, National Electric Code
 - 2. 101, Life Safety Code
- C. Underwriters Laboratories (UL)
 - 1. 263, Fire Tests of Building Construction and Materials
 - 2. 1479, Fire Test of Through-Penetration Firestops
 - 3. 2079, Tests for Fire Resistance of Building Joint Systems
 - 4. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)
 - c. Through-Penetration Firestop System (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - f. Joint Systems (XHBN)
- D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

1.4 PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS

- A. Firestopping Materials:
 - 1. Shall be rated as non-combustible when tested in accordance with ASTM E119 to achieve fire rating noted on the drawings and provide a fire rating equal to that of construction being penetrated. If no such fire rating is noted on the drawings, the fire rating shall be required by the authorities having jurisdiction.
 - 2. If such materials are used in a through-penetration seal condition, they shall be approved for such use, with all required devices and accessories forming an assembly or included in the test, when tested in accordance with ASTM E814 or UL 1479.
 - 3. Tests shall be performed by an approved testing agency to indicate compliance with specified requirements and the resulting approval number shall be the latest or current test approved by authorities having jurisdiction. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other test will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.
- B. Fire Safing Materials:
 - 1. Shall be tested and rated non-combustible to achieve fire rating noted on the drawings, or if not noted, as required by authorities having jurisdiction.

2. If such materials are used in an assembly, they shall be approved for such use, with all required devices and accessories forming an assembly or including in the test.
 3. Tests shall be performed by an approved testing agency to indicate compliance with specified requirements and the resulting approval number shall be the latest or current test approved by authorities having jurisdiction.
 4. Proposed fire safing materials and methods shall conform to applicable governing codes having local jurisdiction.
- C. Definitions: As they appear in this Section:
1. Combustible: Penetrations composed of any material which will burn or melt in a fire, including, but not limited to the following:
 - a. Nonmetallic pipes made of glass or plastic.
 - b. Metallic pipes made of lead or aluminum.
 - c. Electrical, data, communication, security, and telephone cables.
 2. Non-combustible: Penetrations composed of any material which will not burn or melt in a fire, including, but not limited to the following:
 - a. Metallic pipes made of steel, iron or copper.
 3. Approved Testing Agencies: UL or other testing agency licensed and equipped to conduct the required fire tests and approved by authorities having jurisdiction.
 4. Authorities Having Jurisdiction: Shall be the person or entity responsible for applicable governing code enforcement.
- D. Manufacturer Qualifications: Those listed in Paragraph 2.1, A, or company specializing in manufacturing the products specified in this Section with minimum of five (5) years experience. Refer Division 1 for substitutions.
- E. Installer Qualifications: Company specializing in performing the Work of this Section with minimum three (3) years experience installing tested and classified firestop and fire safing systems or manufacturer certification and approval.
- F. Standards: All firestop and fire safing systems shall have a flame (F) rating and temperature (T) rating conforming to applicable building codes and in accordance with Drawings and Specification.
- G. Single Source Responsibility: Obtain firestopping and fire safing materials from a single manufacturer for each different product required.
- H. No firestopping or fire safing material shall be concealed or covered until they have been observed and approved for use by the Architect and/or authorities having jurisdiction.

1.5 CONTRACTOR'S RESPONSIBILITIES

- A. As scope and performance documents, the Drawings and Specifications do not necessarily indicate or describe all the Work required for the performance and completion of the Work. Contracts will be let on the basis of such documents with the understanding that the Contractor shall furnish and install the items required for proper completion of the Work without adjustment to price or schedule. Work shall be of sound, quality construction and the Contractor shall be solely responsible for the inclusions of adequate labor and materials to cover the proper and timely furnishing and installation of the firestopping and fire safing indicated, described, or implied.
- B. As a performance specification, the criteria for the solution of the firestopping and fire safing indicated on the Drawings or specified herein are for the sole purpose of defining

the design intent and performance requirements. The details shown, if any, are intended to emphasize the acceptable performance requirements for this Project. To avoid any misunderstanding or lack of interpretation, the Contractor is hereby advised that the responsibility for all firestopping and fire safing are totally his and that designs and resolutions proposed by the contractor through his submittals and related documentation shall be demonstrated throughout the Work and warranty period specified herein.

- C. Design proposal submissions which follow exactly the details indicated on the Drawings, will not relieve the Contractor of his responsibility for the design, furnishing, installation, or performance of the Work of this Section.
- D. In the event of a controversy over any requirements of this Section, the decision of the Architect will take precedence.

1.6 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's technical data on product characteristics, performance, and limitation criteria for each material including UL firestop systems to be used.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's Material Data Sheets (MSDS)
- B. Shop Drawings: Manufacturer's shop drawings or detail sheets indicating each condition that requires a penetration or joint seal. Details must be in accordance with the proposed approved system. Include materials to be used, anchorage, methods of installation and relationship to all adjacent construction.
- C. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in drawing.
- D. Certifications:
 - 1. Manufacturer's certification of compliance indicating approval of authorities having jurisdiction for combustibility and use of materials, and that their installation conforms to shown or required fire rating.
 - 2. Manufacturers affidavit that materials used in Project contain no asbestos.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- B. Installer Training: A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

1.9 REGULATORY REQUIREMENTS

- A. Conform fire resistance ratings and surface burning characteristics of authorities having jurisdiction.
- B. Provide certificate of compliance from manufacturer indicating approval of authorities having jurisdiction for combustibility and use of materials, and that their installation conforms to shown or required fire rating.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not use materials that contain flammable solvents.
- B. Verify existing conditions and substrates before stating work. Correct unsatisfactory conditions before proceeding.
- C. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- D. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.
- E. Provide ventilation in areas to receive solvent cured materials.

1.11 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements

1.12 SEQUENCING

- A. Sequence Work to permit firestopping and fire safing materials to be installed after adjacent and surrounding work is complete.

1.13 WARRANTY

- A. Warrant the work specified herein for two (2) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.
- B. Defects shall include, but not be limited to:

1. Use of incorrect material within the installation.
2. No mineral wool insulation within a system that requires it.
3. Use of mineral wool insulation when ceramic fiber insulation is required.
4. Incorrect amount of material is installed within system.
5. No use of an accessory seal within a system that requires one.
6. Use of an incorrect system with a firestop or fire safing installation
7. Failure to meet specified performance or quality assurance requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCTS

- A. Subject to compliance with through penetration firestop systems listed in Volume II of the UL Fire Resistance Directory (XHEZ), manufacturers specified are approved for use in 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.
 1. Hilti, Inc.
 2. Nelson Firestop Products
 3. Tremco Inc.
 4. 3M Fire Protection Products
- B. To maintain clarity of products, specifications are based on specified products manufactured by Hilti, Inc.; Tulsa, OK. Listed manufacturers providing equivalent products are acceptable for use on this project.
- C. It is recognized that the manufacturers listed may not produce all of the specified types of products, therefore, products from several manufacturers may be used throughout the project as long as consistent use of each individual product is maintained throughout the project, they meet the requirements specified herein for the intended use, and are approved for that use by authorities having jurisdiction. Products which are combined to form a UL listed assembly must be provided as tested and approved as shown in the Fire Resistance Directory.

2.2 MATERIALS AND COMPONENTS

- A. General:
 1. Any of the following materials, either by itself or in combination with other materials may be used on the Project provided they:
 - a. Satisfy the firestopping and fire safing requirements for use in the required application on the Project.
 - b. Meet the performance and quality assurance requirements specified herein.
 - c. Are approved for use in that application by the authorities having jurisdiction.
 2. Materials shall comply with ASTM E814 (UL 1479) or ASTM E119 (UL 263), and shall be manufactured of non-toxic, non-hazardous, asbestos free materials. Product shall bear proper independent test laboratory label/logo and shall conform to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.
- B. Primers: Conform to firestop manufacturer's recommendations for primers required for various substrates and conditions.

- C. Back-Up (Damming) Materials: Conform to firestop manufacturer's recommendations for back-up (damming) materials. Material may be removable or permanent as recommended by manufacturer to suit application and as required by UL testing or other testing agency approved by authorities having jurisdiction.
- D. Retainers: Steel angles, clips, sheet metal, and impaling fasteners to support damming material and fire safing material and where required by UL testing or other testing agency approved by authorities having jurisdiction.
- E. Adhesives and Fasteners: Conform to firestop manufacturer's recommendations for adhesives and fasteners required for various substrates and conditions and to suit intended use. Materials must conform to those required by UL testing or other testing agency approved by authorities having jurisdiction.
- F. Firestopping Fill, Void, and Cavity Materials: Shall conform to those required by UL testing or other testing agency approved by authorities having jurisdiction, including, but not be limited to the following. Refer to list of approved manufacturers:
 - 1. Cast-in place firestop devices for use with combustible and non-combustible pipes (closed and open piping systems) and penetrating concrete floors, the following products are acceptable:
 - a. "CP 680 Cast-In Place Firestop Device" manufactured by Hilti, Inc.
 - 1) Add Aerator adaptor when used in conjunction with aerator ("sovent") system.
 - b. "CP 681 Tub Box Kit" for use with tub installations manufactured by Hilti, Inc.
 - c. "CP 682 Cast-In Place Firestop Device" for use with noncombustible penetrants manufactured by Hilti, Inc.
 - 2. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - a. "FS-ONE Intumescent Firestop Sealant" manufactured by Hilti, Inc.
 - b. "CP 604 Self-leveling Firestop Sealant" manufactured by Hilti, Inc.
 - c. "CP 620 Fire Foam" manufactured by Hilti, Inc.
 - d. "CP 606 Flexible Firestop Sealant" manufactured by Hilti, Inc.
 - e. "CP 601s Elastomeric Firestop Sealant" manufactured by Hilti, Inc.
 - 3. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - a. "CP 601s Elastomeric Firestop Sealant" manufactured by Hilti, Inc.
 - b. "CP 606 Flexible Firestop Sealant" manufactured by Hilti, Inc.
 - c. "FS-ONE Intumescent Firestop Sealant" manufactured by Hilti, Inc.
 - 4. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
 - a. "FS-ONE Intumescent Firestop Sealant" manufactured by Hilti, Inc.
 - 5. Foams, Intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
 - a. "FS-ONE Intumescent Firestop Sealant" manufactured by Hilti, Inc.
 - b. "CP 620 Fire Foam" manufactured by Hilti, Inc.
 - c. "CP 601s Elastomeric Firestop Sealant" manufactured by Hilti, Inc.
 - d. "CP 606 Flexible Firestop Sealant" manufactured by Hilti, Inc.
 - 6. Non curing, re-penetrable, intumescent putty or foam materials for use with flexible cable or cable bundles, the following precuts are acceptable:

- a. "CP 618 Firestop Putty Stick: manufactured by hilti, Inc.
 - b. "CP 658T Firestop Plub" manufactured by Hilti, Inc.
- 7. Wall opening protective materials for use with UL listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
 - a. "CP 617 Firestop Putty Pad" manufactured by Hilti, Inc.
- 8. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
 - a. "CP 643N Firestop Collar" manufactured by Hilti, Inc.
 - b. "CP 644 Firestop Collar" manufactured by Hilti, Inc.
 - c. "CP 645/648 Wrap Strips" manufactured by Hilti, Inc.
- 9. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - a. "CP 637 Firestop Mortar" manufactured by Hilti, Inc.
 - b. "FS 657 FIRE BLOCK" manufactured by Hilti, Inc.
 - c. "CP 620 Fire Foam" manufactured by Hilti, Inc.
 - d. "CP 675T Firestop Board" manufactured by Hilti, Inc.
- 10. Non curing, re-penetrable materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
 - a. "FS 657 FIRE BLOCK" manufactured by Hilti, Inc.
 - b. "CP 675T Firestop Board" manufactured by Hilti, Inc.
- 11. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
 - a. "FS 657 FIRE BLOCK" manufactured by Hilti, Inc.
 - b. "CP 658T Firestop Plub" manufactured by Hilti, Inc.
- G. Fire Related Construction Joints and Other Gaps:
 - 1. "CP 601S Elastomeric Firestop Sealant" manufactured by Hilti, Inc.
 - 2. "CP 606 Flexible Firestop Sealant" manufactured by Hilti, Inc.
 - 3. "CP 672 Firestop Joing Speed Spray" manufactured by Hilti, Inc.
- H. Fire Safing Materials: Comply with ASTM C665, Type I, high-melt mineral-fiber insulation with minimum nominal density of 4.0 lbs per cubic foot and having a maximum flame spread rating of 15 and smoke developed rating of 0. Size shall be 4 inches thick by 24 inches wide by 48 inches long, unless noted otherwise. Products containing asbestos strictly prohibited.
 - 1. "Thermafiber Safing Insulation" manufactured by Thermafiber, Inc.
 - 2. "Fibrex Safing Insulation" manufactured by Fibrex Insulations, Inc.
 - 3. "Delta Safing Board" manufactured by Rock Wool Manufacturing Company.
- I. Jacketing (For use with fire protection board): 0.016 inch aluminum or 0.010 inch stainless steel roll jacketing as shown, or if not shown, as required where high traffic requires high durability and good appearance, and as directed by Architect.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine joints and openings indicated or required to receive firestop and fire safing materials, for compliance with requirements for proper configuration, installation

Section 07270 - 8
tolerances and other conditions affecting firestop and fire safing performance.

- B. Do not proceed with installation until unsatisfactory conditions are corrected.
- C. Beginning installation shall indicate acceptance of existing conditions. Work found to be defective or deficient due to uncorrected existing conditions prior to installation should be repaired or replaced at no additional expense to Owner.

3.2 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Install back-up (damming) materials to arrest liquid material leakage.
 - 5. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

3.3 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.4 INSTALLATION

- A. General:
 - 1. Install firestop and fire safing materials in accordance with manufacturer's recommendations to provide F and T ratings as required by authorities having jurisdiction.
 - 2. Install firestop materials in accordance with UL Fire Resistance Directory.
 - 3. Install firestop and fire safing materials with sufficient pressure to properly fill and seal openings, then tool or trowel exposed surfaces.
- B. Firestopping Materials:
 - 1. Install primer and firestopping material in sufficient thickness, with required accessories to achieve rating, to uniform density and texture, in accordance with manufacturer's instructions and authorities having jurisdiction.
 - 2. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
 - 3. Consult with mechanical engineer, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 4. Remove dam material after firestopping material has cured or allow dam material to remain if required to maintain fire rating integrity or required by authorities having jurisdiction.
 - 5. Do not conceal or enclose any firestopping materials until they have been

- C. Fire Safing Materials:
 - 1. Install fire safing in sufficient thickness, with retainer materials where shown or required to achieve fire rating in accordance with manufacturer's instructions and authorities having jurisdiction.
 - 2. Do not conceal or enclose any fire safing materials until they have been examined and approved for use by the Architect and authorities having jurisdiction.
- D. Fire Protection Board Materials:
 - 1. Install fire protection board in proper type, size, and density, with adhesives, fasteners, and jacketing materials where shown or required to achieve fire rating in accordance with manufacturer's instructions and authorities having jurisdiction.
 - 2. Do not conceal or enclose any fire protection board materials until they have been examined and approved for use by the Architect and authorities having jurisdiction.

3.5 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

3.6 CLEANING

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

3.7 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing area.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E2174, "Standard Practice for On-Site Inspection of Installed Fire Stops".
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

END OF SECTION

SECTION 074113
METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Mechanically-seamed, standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED SECTIONS

- A. Section 07220 "Roof and Deck Insulation" for thermal insulation installed under metal panels.
- B. Section 07175 "Self Adhering Roof Underlayment" for air barriers within roof assembly and adjacent to roof assembly.
- C. Section 07410 "Metal Wall Panels" for factory-formed metal wall panels.
- D. Section 074293 "Soffit and Liner Panels" for factory-formed soffit panels.
- E. Section 07611 "Prefabricated Metal Building Roof Curbs" for formed sheet metal curbs for roof accessories.
- F. Section 07620 "Sheet Metal Flashing and Trim" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.
- G. Division 07900 "Building Sealants" for field-applied joint sealants.

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
 - 2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.

5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
6. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
10. ASTM E 1514 - Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
11. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
12. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
13. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
14. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

D. FM Global (FM): www.fmglobal.com:

1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.

E. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

F. Underwriters Laboratories, Inc. (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, manufacturer's technical representative, inspection agency and related trade contractors.

1. Coordinate building framing in relation to metal panel system.
2. Coordinate openings and penetrations of metal panel system.
3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.5 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum five years experience in manufacture of similar products in successful use in similar applications.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

- a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.
 - e. Sample warranty.
 - f. IAS AC 472 certificate.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 - 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Installer Qualifications: Experienced Installer certified by metal panel manufacturer with minimum of five years experience with successfully completed projects of a similar nature and scope.
- 1. Installer's Field Supervisor: Experienced mechanic certified by metal panel manufacturer supervising work on site whenever work is underway.

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.
 - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.
 - 2. Include data indicating compliance with performance requirements.
 - 3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 24-inch-long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.
- D. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's standard warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
 - 1. Deliver, unload, store, and erect metal panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 - 2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

- A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within one year from date of Substantial Completion.
- B. **Special Weathertightness Warranty:** On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, up to cost limitation of seven dollars (\$7.00) per square foot of covered area within 20 years from date of Substantial Completion.
- C. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within 25 years from date of Substantial Completion, including:

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design Manufacturer: **MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.**; Houston TX. Tel: (877)713-6224; Email: info@mbci.com; Web: www.mbci.com.
 - 1. Provide basis of design product[, or comparable product approved by Architect prior to bid].

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

- B. System Performance: Comply with ASTM E 1514 and requirements of this Section.
- C. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
 - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - a. Wind Uplift Testing: Certify capacity of metal panels by actual testing of proposed assembly per ASTM E 1592.
 - 2. Snow Loads: [As indicated].
 - 3. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of [1/180] of the span with no evidence of failure.
 - 4. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."
- D. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class UL-90 with prescriptive increases at perimeter and corner conditions.

Specifier: Retain FM Approvals' listing requirement for FM Global-insured projects or where FM Global requirements are used as minimum design standard. Select required windstorm classification based upon calculation method in FM Global Loss Prevention Data Sheet 1-28; note that FM Approvals' windstorm classification does not correlate directly to design wind speed.

- E. **FM Approvals Listing:** Comply with FM Approvals 4471 as part of a panel roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 construction. Identify materials with FM Approvals markings.
 - 1. Fire/Windstorm Classification: Class 1A-90 with prescriptive increases at perimeter and corner conditions.
 - 2. Hail Resistance Rating: SH.
- F. **Florida State Building Code Compliance:** Comply with requirements of Florida State Building Code. www.floridabuilding.org/pr_app_srch.aspx
- G. Air Infiltration, ASTM E 1680: Maximum 0.09 cfm/sq. ft. (0.457 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
- H. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 12 lbf/sq. ft. (575 Pa).
- I. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

2.3 METAL ROOF PANELS

- A. Mechanically-seamed, Concealed Fastener, Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with vertical ribs at panel edges, installed by lapping and mechanically interlocking edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.
 - 1. Basis of Design: **MBCI, SuperLok**, www.mbc.com/superlok.html.

2. **Aluminum-Zinc Alloy-Coated Steel Sheet:** ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 unpainted Galvalume Plus coating.
 - a. Nominal Coated Thickness: 0.028 inch/24 gage (0.71 mm)
 - b. Panel Surface: Smooth with striations in pan
 - c. Exterior Finish: Exposed Galvalume Plus coating
3. Panel Width: [16 inches (406 mm)].
4. Panel Seam Height: 2 inch (50.8 mm).
5. Joint Type: Mechanically seamed.

2.4 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in profiles as indicated. Provide required fasteners, closure strips, thermal spacers, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Clips: Provide panel clip of type specified, at spacing indicated on approved shop drawings.
 1. **Two-piece Floating:** ASTM C 645, with ASTM A 653/A 653M, G90 hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
 2. **Single-Piece Fixed:** ASTM C 645, with ASTM A 653/A 653M, G90 hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply long life fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
 2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
 3. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
- F. **Roof Accessories:** Approved by metal roof panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate and supports with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.
 - 1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
 - 2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:
 - a. 1/4 inch (6 mm) in 20 foot (6.1 m) in any direction.
 - b. 3/8 inch (9 mm) over any single roof plane.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.2 PREPARATION

- A. **Miscellaneous Supports:** Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.
- B. Flashings: Install flashings to cover exposed underlayment per Section 07 62 00 "Sheet Metal Flashing and Trim."

3.3 METAL PANEL INSTALLATION

- A. Mechanically-Seamed, Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to supports using clips, screws, fasteners, and sealants recommended by manufacturer and indicated on approved shop drawings.
 - 1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 - 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 - 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.

4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.

3.4 ACCESSORY INSTALLATION

- A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with weather tight mounting. Provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 3. Provide concealed fasteners except where noted on approved shop drawings.
 4. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
- B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.
 1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal roof panel manufacturer's instructions. Clean finished surfaces as recommended by metal roof panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 074293

SOFFIT AND LINER PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Flush-profile, concealed fastener, lap-seam metal soffit and liner panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

- A. Division 07 Section "Thermal Insulation" for thermal insulation installed under metal panels.
- B. Division 07 Section "Air Barriers" for air barriers within metal panel assembly and adjacent to metal panel assembly.
- C. Division 07 Section "Metal Roof Panels" for metal roof panels installed with metal soffit and liner panels.
- D. Division 07 Section "Metal Wall Panels" for metal wall panels installed with metal soffit and liner panels.
- E. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing items in addition to items specified in this Section.

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
 - 2. AAMA 809.2 Voluntary Specification Non-Drying Sealants.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 2. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 3. ASTM C920 - Specification for Elastomeric Joint Sealants.
 - 4. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 5. ASTM D4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 6. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

- D. International Accreditation Service (IAS):
 - 1. IAS AC472 Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

1.4 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer accredited under IAS AC472, Part B.
- B. Installer Qualifications: Experienced Installer [certified by metal panel manufacturer] with minimum of five years experience with successfully completed projects of a similar nature and scope.
 - 1. Installer's Field Supervisor: Experienced mechanic [certified by metal panel manufacturer] supervising work on site whenever work is underway.
- C. Buy American Compliance: Materials provided under work of this Section shall comply with the following requirements:
 - 1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
 - 2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).
- D. Steel Construction Publications: Comply with published recommendations in the following, unless more stringent requirements are indicated.
 - 1. American Institute of Steel Construction (AISC): "Steel Construction Manual."
 - 2. American Iron and Steel Institute (AISI): "Cold Formed Steel Design Manual."

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.
 - 1. Coordinate building framing in relation to metal panel system.
 - 2. Coordinate openings and penetrations of metal panel system.
 - 3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products. Include data indicating compliance with performance requirements.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
 - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.

2. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification: Provide 12-inch long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements.
- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC472 Part B.
- D. Buy American Certification: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.
- E. Manufacturer's warranty: Unexecuted sample copy of manufacturer's warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping.
 1. Deliver, unload, store, and erect metal panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 2. Store in accordance with Manufacturer's written instruction. Provide wood collars for stacking and handling in the field.
 3. Shield foam insulated metal panels from direct sunlight until installation.

1.10 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within [one] year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design Manufacturer: MBCI Metal Roof and Wall Systems, Division of NCI Group, Inc.; Houston TX. Tel: (877)713-6224; Email: info@ecoficientseries.com; Web: www.mbc.com.

1. Provide basis of design product or comparable product approved by Architect prior to bid.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
- B. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, as determined by ASTM E1592:
 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - a. Wind Negative Pressure: Certify capacity of metal panels by actual testing of proposed assembly.
 2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/120 of the span with no evidence of failure.
 3. Seismic Performance: Comply with ASCE 7 Sections 9, "Earthquake Loads."
- C. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.

2.3 FORMED METAL SOFFIT AND LINER PANELS

- A. Flush-Profile, Concealed Fastener Metal Soffit and Liner Panels: Metal panels consisting of formed metal sheet with vertical panel edges, with flush joints between panels, field assembled with nested lapped edges, and attached to supports using concealed fasteners.
 1. Basis of Design: MBCI, Artisan Series Panels.
 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, structural quality, Grade 50, Coating Class AZ55 pre-painted by the coil-coating process per ASTM A755/A755M.
 - a. Nominal Thickness: 0.023 inch/24 gage coated thickness, with smooth surface.
 - 1) Exterior Finish: Exposed Galvalume Plus coating.
 3. Panel Width: 12 inches
 4. Panel Thickness: 1 inch

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide complete metal panel assemblies incorporating trim, fasciae, and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panels.

- C. Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.
- D. Panel Sealants:
 - 1. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
 - 2. Elastomeric Joint Sealant: Urethane sealant, single-component, ASTM C920 Type S, Grade NS, Class 25, Use NT, A, M, G, O.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.6 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- B. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat[, meeting solar reflectance index requirements].
 - 1. Basis of Design: MBCI, Signature 200.
- C. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621[, meeting solar reflectance index requirements].
 - 1. Basis of Design: MBCI, Signature 300.
- D. Interior Face Sheet Coil-Coated Finish System:
 - 1. Silicone Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - a. Basis of Design: MBCI, USDA White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.
 - 1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.
 - 2. Panel Support Tolerances: Confirm that metal panel supports are within tolerances acceptable to metal panel manufacturer but not greater than the following:
 - a. At Rafter Spacing 24 inches or More: 1/8 inches out only.

- b. At Rafter Spacing Less Than 24 inches: 3/32 inches out only.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 METAL PANEL INSTALLATION

- A. Concealed-Fastener Formed Metal Soffit Panels: Install metal panel system in accordance with manufacturer's written instructions, approved shop drawings, project drawings, and referenced publications. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer. Fasten panel to support structure through leading panel flange. Fit back flange of subsequent panel into secured flange of previous panel.
 - 1. Cut panels in field where required using manufacturer's recommended methods.
 - 2. Provide weatherproof jacks for pipe and conduit penetrating metal panels.
 - 3. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.
- C. Attach panel flashing trim pieces to supports using recommended fasteners and joint sealers.
- D. Joint Sealers: Install liquid sealants where indicated and where required for weatherproof performance of metal panel assemblies.
 - 1. Seal panel joints and openings using joint sealers indicated in manufacturer's instructions.
 - 2. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.3 ACCESSORY INSTALLATION

- A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel assembly, including trim, flashings, sealants, closure strips, and similar items.
 - 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - 3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

3.4 CLEANING AND PROTECTION

- A. Clean finished surfaces as recommended by metal panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 07462
FIBER CEMENT SIDING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Factory-finished fiber cement lap siding, panels, single, trim, fascia, moulding and accessories, James Hardie HZ10 Engineered for Climate Siding.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Wood framing and bracing.
- B. Section 06100 - Rough Carpentry: Sheathing.
- C. Section 07210 - Insulation: Exterior wall insulation.
- D.

1.3 REFERENCES

- A. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- B. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding and/or trim materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

- B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

- A. Product Warranty: Limited, non-pro-rated product warranty.
 - 1. HardiePlank HZ10 lap siding for 30 years.
 - 2. HardieShingle HZ10 shingle siding for 30 years
- B. Finish Warranty: Limited product warranty against manufacturing finish defects.
 - 1. When used for its intended purpose, properly installed and maintained according to Hardie's published installation instructions, James Hardie's ColorPlus finish with ColorPlus Technology, for a period of 15 years from the date of purchase: will not peel; will not crack; and will not chip. Finish warranty includes the coverage for labor and material.
- C. Workmanship Warranty: Application limited warranty for 2 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: James Hardie Building Products, Inc., which is located at: 26300 La Alameda Suite 400 ; Mission Viejo, CA 92691; Toll Free Tel: 866-274-3464; Tel: 949-367-4980; Fax: 949-367-4981; Email: [request info \(info@jameshardie.com\)](mailto:requestinfo@jameshardie.com); Web: <http://www.jameshardiecommercial.com/>
- B. Requests for approval of equal substitutions will be considered in accordance with provisions of Section 01600.

2.2 SIDING

- A. HardiePlank HZ10 lap siding, and HardieShingle HZ10 siding requirement for Materials:
 - 1. Fiber-cement Siding - complies with ASTM C 1186 Type A Grade II.
 - 2. Fiber-cement Siding - complies with ASTM E 136 as a noncombustible

- material.
 - 3. Fiber-cement Siding - complies with ASTM E 84 Flame Spread Index = 0, Smoke Developed Index = 5.
 - 4. CAL-FIRE, Fire Engineering Division Building Materials Listing - Wildland Urban Interface (WUI) Listed Product.
 - 5. National Evaluation Report No. NER 405 (BOCA, ICBO, SBCCI, IBC, IRC).
 - 6. City of Los Angeles, Research Report No. 24862.
 - 7. Miami Dade County, Florida Notice of Acceptance 07-0418.04.
 - 8. US Department of Housing and Urban Development Materials Release 1263d
 - 9. California DSA PA-019.
 - 10. City of New York M EA 223-93-M.
 - 11. Florida State Product Approval FL889.
 - 12. Texas Department of Insurance Product Evaluation EC-23.
- B. Lap Siding: HardiePlank HZ10 Lap as manufactured by James Hardie Building Products, Inc.
- 1. Type: Smooth 7-1/4 inches (184 mm) with 6 inches (152 mm) exposure.
- C. Shingle Siding: HardieShingle HZ10 siding as manufactured by James Hardie Building Products, Inc.
- 1. Type: HardieShingle Staggered-Edge Notched Panel 48 inches (1219 mm) wide by 16 inches (406mm) high with 7 inches (178 mm) exposure.
- D. Trim:
- 1. HardieTrim HZ10 boards as manufactured by James Hardie Building Products, Inc.
 - a. Product: 5/4 Boards, 3-1/2 inch (89 mm) width.
 - b. Texture: Wood Grained.
 - c. Length: 12 feet (3658 mm).
 - d. Thickness: 1 inch (24 mm).
 - 2. HardieTrim HZ10 Fascia boards as manufactured by James Hardie Building Products, Inc.

2.3 FASTENERS

- A. Wood Framing Fasteners:
- 1. Wood Framing: 6d common corrosion resistant nails.

2.4 FINISHES

- A. Factory Finish: Refer to Exterior Finish Schedule.
- 1. Product: ColorPlus Technology by James Hardie.
 - 2. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
 - 3. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
 - 4. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
 - 5. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Nominal 2 inch by 4 inch (51 mm by 102 mm) wood framing selected for minimal shrinkage and complying with local building codes, including the use of water-resistive barriers or vapor barriers where required. Minimum 1-1/2 inches (38 mm) face and straight, true, of uniform dimensions and properly aligned.
 - 1. Install water-resistive barriers and claddings to dry surfaces.
 - 2. Repair any punctures or tears in the water-resistive barrier prior to the installation of the siding.
 - 3. Protect siding from other trades.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Install a water-resistive barrier is required in accordance with local building code requirements and as required elsewhere in the Specification Manual.
- D. The water-resistive barrier must be appropriately installed with penetration and junction flashing in accordance with local building code requirements.
- E. Use HardieWrap™ Seam Tape at joints and laps.
- F. Install and HardieWrap™ flashing, HardieWrap™ Flex Flashing.

3.3 INSTALLATION - HARDIEPLANK HZ10 LAP SIDING AND ARTISAN HZ10 LAP SIDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inches (32 mm) wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- C. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- D. Align vertical joints of the planks over framing members.
- E. Maintain clearance between siding and adjacent finished grade.
- F. Locate splices at least one stud cavity away from window and door openings.
- G. Use off-stud metal joiner in strict accordance with manufacturer's installation instructions.
- H. Wind Resistance: Where a specified level of wind resistance is required Hardieplank lap siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER-405.

- I. Face nail to sheathing.
- J. Locate splices at least 12 inches (305 mm) away from window and door openings.

3.4 INSTALLATION - HARDIE HZ10 SHINGLESIDE CLADDING

- A. Install materials in strict accordance with manufacturer's installation instructions.
- B. Substrate: Install a minimum 7/16 inch (11 mm) thick OSB wall sheathing or equivalent braced walls complying with applicable building codes.
- C. Starting: Install a minimum 1/4 inch (6 mm) thick lath starter strip at the bottom course of the wall.
- D. Maintain clearance between siding and adjacent finished grade.
- E. Apply starter course of 10 inches (254 mm) shingles or 9-1/2 inches (241 mm) lap siding overlapping the starter strip.
- F. Apply subsequent courses horizontally with a minimum 10 inch overlap at the top and a minimum 2 inch (51 mm) side lap. The bottom edge of the first two courses overlaps the starter strip.
- G. Fasten between 1/2 inch (13 mm) and 1 inch (25 mm) in from the side edge and between 8-1/2 inches (216 mm) and 9 inches (229 mm) up from the shingle bottom edge.
- H. Allow minimum vertical clearance between the edge of siding and any other material in strict accordance with the manufacturer's installation instructions.
- I. Ensure vertical joints of overlapping shingle course do not align.
- J. Wind Resistance: Where a specified level of wind resistance is required, Hardie Shingle siding is installed to substrate and secured with a minimum two fasteners described in Table No. 6, 7 and 8 in National Evaluation Service Report No. NER-405.

3.5 INSTALLATION - HARDIETRIM HZ10 BOARDS

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten through trim into structural framing or code complying sheathing. Fasteners must penetrate minimum 3/4 inch (19 mm) or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch (19 mm) and no further than 2 inches (51 mm) from side edge of trim board and no closer than 1 inch (25 mm) from end. Fasten maximum 16 inches (406 mm) on center.
- D. Maintain clearance between trim and adjacent finished grade.
- E. Trim inside corner with a single board trim both side of corner.
- F. Outside Corner Board Attach Trim on both sides of corner with 16 gage corrosion resistant finish nail 1/2 inch (13 mm) from edge spaced 16 inches (406 mm) apart, weather cut each end spaced minimum 12 inches (305 mm) apart.

- G. Allow 1/8 inch gap between trim and siding.
- H. Seal gap with high quality, paint-able caulk.
- I. Shim frieze board as required to align with corner trim..
- J. Fasten through overlapping boards. Do not nail between lap joints.
- K. Overlay siding with single board of outside corner board then align second corner board to outside edge of first corner board. Do not fasten HardieTrim boards to HardieTrim boards.
- L. Shim frieze board as required to align with corner trim.
- M. Install HardieTrim Fascia boards to rafter tails or to sub fascia.

3.6 FINISHING

- A. Finish unprimed siding with a minimum one coat high quality, alkali resistant primer and one coat of either, 100 percent acrylic or latex or oil based, exterior grade topcoats or two coats high quality alkali resistant 100 percent acrylic or latex, exterior grade topcoat within 90 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.
- B. Finish factory primed siding with a minimum of one coat of high quality 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.7 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07480

METAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preformed, pre-finished metal roofing and flashings.
- B. Miscellaneous trim, flashing, closures, drip flashing, and accessories.
- C. Sealant
- D. Fastening devices.

1.02 RELATED SECTIONS

- A. Section 05120: Structural Steel Framing.
- B. Section 05500: Miscellaneous metal fabrication.
- C. Section 06100: Rough Carpentry.
- D. Section 07631: Flashing and Sheet Metal Gutters.
- E. Section 07900: Sealants.

1.03 REFERENCES

- A. American Iron & Steel Institute (AISI) Specification for the Design of Coldformed Steel Structural Members.
- B. ASTM A-653 & ASTM A924 Steel Sheet, Zinc-Coated (Galvanized)
- C. ASTM E-283-84
- D. ASTM E-331-86
- E. Spec Data Sheet - Galvalume Sheet Metal by Bethlehem Corp.
- F. SMACNA - Architectural Sheet Metal Manual.

1.04 ASSEMBLY DESCRIPTION

- A. The roofing assembly includes preformed sheet metal panels, related accessories, valleys, hips, ridges, eaves, corners, rakes, miscellaneous flashing and attaching devices.

1.05 SUBMITTALS

A. Submit detailed drawings showing layout of panels, anchoring details, joint details, trim, flashing, and accessories. Show details of weatherproofing, terminations, and penetrations of metal work.

B. Submit a sample of each type of roof panel, complete with factory finish.

1.06 QUALITY ASSURANCE

A. Manufacturer: Company specializing in Architectural Sheet Metal Products with ten (10) years minimum experience.

B. No product substitutions shall be permitted without meeting specifications.

C. Substitutions shall be submitted 10 Days prior to Bid Date and acceptance put forth in an addendum.

D. No substitutions shall be made after the Bid Date.

1.07 DELIVERY, STORAGE AND HANDLING

A. Upon receipt of panels and other materials, installer shall examine the shipment for damage and completeness.

B. Panels should be stored in a clean, dry place. One end should be elevated to allow moisture to run off.

C. Panels with strippable film must not be stored in the open, exposed to the sun.

D. Stack all materials to prevent damage and to allow for adequate ventilation.

1.08 WARRANTY

A. Galvalume material shall have a twenty year guarantee against failure due to corrosion, rupture or perforation.

B. Applicator shall furnish guarantee covering water tightness of the roofing system for the period of two (2) years from the date of substantial completion.

PART 2 PRODUCT

2.01 ACCEPTABLE MANUFACTURERS

A. MBCI, Houston, Texas; Berridge Manufacturing Company, Houston, Texas;

B. Substitutions shall fully comply with specified requirements.

2.02 SHEET MATERIALS

A. Pre-finished Metal shall be pre-finished Galvalume - ASTM A792-86 AZ-55.

B. Unfinished Metal shall be Grade C Galvalume ASTM 792-86, AZ 55, "Satin Finish".

C. Strippable film shall be applied to the top side of the painted coil to protect the finish during fabrication, shipping and field handling. This strippable film must be removed before installation.

2.03 ACCESSORY MATERIALS

A. Fasteners: Stainless Steel with washers where required.

B. Sealant: As specified in Section 07900 [] Type.

2.04 FABRICATION

A. All exposed adjacent flashing shall be of the same material and finish as the roof panels.

B. Hem all exposed edges of flashing on underside, 1/2 inch.

2.05 MBCI "7.2" PANEL

1. Overall panel width to be 35", with 32" nominal coverage.

2. Panels shall be factory formed to 40' max.

3. 2.146" Corrugations to be spaced 7.2" on center.

3. 7.2 Panel shall be 26 gage.

4. Panel-to-panel and panel-to-furring connections to be with No. 12-14 self-drilling fasteners, 1" min. for panel-to-furring connections, 3/4" minimum for panel-to-panel connections. Panel should be fastened at 16" on center horizontally over the length of the panel and 5" on center at panel ends.

5. Panels shall be fastened to minimum 16 gage furring at 4'-0" on center max.

2.06 MBCI "FW-120" PANEL

1. Overall panel width to be 12" nominal coverage.

2. Panels shall be factory formed to 40' max.

3. FW-120 Panel shall be 24 gage.

4. Panel-to-panel and panel-to-furring connections to be with No. 12-14 self-drilling fasteners, 1" min. for panel-to-furring connections, 3/4" minimum for panel-to-panel connections. Panel should be fastened at 16" on center horizontally over the length of the panel and 5" on center at panel ends.

5. Panels shall be fastened to minimum 16 gage furring at 3'-0" on center max.

PART 3 EXECUTION

3.01 INSPECTION

A. Substrate:

1. Examine 16 gage furring zeos to ensure proper attachment to CMU backup wall.
3. Verify wall openings, windows, doors, penetrations, ducts or vents through wall are solidly set, cant strips and reglets in place, and nailing strips located.
4. Verify deck is dry and free of snow or ice. [Flutes in steel deck to be clean and dry] or [joints in wood deck to be solidly supported and nailed].

B. Underlayment:

1. Verify #30 unperforated asphalt saturated roofing felt underlayment has been installed over solid sheathing and fastened in place.
2. One (1) layer of #30 asphalt roofing felt paper for roof slopes of 3:12 and up, two (2) layers for roof slopes of 1:12 - 3:12 in moderate climates (check with Berridge).
3. Grace Ice & Water Shield underlayment to be used on all curved applications and on low (less than 1:12) slope or complex roofs per Berridge recommendation.
4. Ensure felt installed horizontally, starting at eave to ridge with a 6" minimum overlap and 18" endlaps.
5. Ensure that all nail heads are totally flush with the substrate. Nails shall be galvanized roofing nails with Berridge Coated Felt Caps.

3.02 INSTALLATION

- A. Comply with manufacturers standard instructions and conform to standards set forth in the Architectural Sheet Metal Manual published by SMACNA, in order to achieve a watertight installation.
- B. Install panels in such a manner that horizontal lines are true and level and vertical lines are plumb.
- C. Install starter and edge trim before installing roof panels.
- D. Remove protective strippable film prior to installation of roof panels.
- E. Attach panels using manufacturer's standard clips and fasteners, spaced in accordance with approved shop drawings.
- F. Install sealants for preformed roofing panels as approved on shop drawings.
- G. Do not allow panels or trim to come into contact with dissimilar materials.
- H. Do not allow traffic on completed roof. If required, provide cushioned walk boards.

I. Protect installed roof panels and trim from damage caused by adjacent construction until completion of installation.

J. Remove and replace any panels or components which are damaged beyond successful repair.

3.03 CLEANING

A. Clean any grease, finger marks or stains from the panels per manufacturer's recommendations.

B. Remove all scrap and construction debris from the site.

3.04 FINAL INSPECTION

A. Final inspection will be performed by a firm appointed and paid for by the owner in accordance with section 01410.

END OF SECTION

SECTION 07611

PREFABRICATED METAL BUILDING ROOF CURBS

PART 1 GENERAL

- 1.01 The general conditions and supplemental general conditions of the contract apply to this section as if completely written here-in.
- 1.02 The general contractor shall provide all labor, material and equipment to completely install prefabricated metal roof curbs.
- 1.03 Prefabricated metal curbs shall be used at all roof penetrations including but not limited to HVAC units, skylights, duct openings, pipe penetrations and exhaust fans.

PART 2 PRODUCTS

- 2.01 Prefabricated metal roof curbs shall be manufactured by LMCurbs, 827 Fisher Road, Longview, Texas 75604, Tel: 1-903-759-1331, 1-800-284-1412, Fax 903-759-0879

PART 3 CONSTRUCTION

- 3.01 Curbs shall be constructed using minimum .080 3003H14 aluminum, or heavier as required to support the load of the equipment, with fully mitered and welded corners, integral base plates, with water diverter cricket. Factory installed insulation available upon request
- 3.02 Minimum height of curb shall be 8" above finished roof (or as specified.)
- 3.03 Curbs shall be constructed to match slope of roof and provide a level top surface for mounting of equipment.
- 3.04 Curb flange shall be constructed to match configuration of roof panel.

PART 4 COORDINATION

- 4.01 Size of curbs and required options shall be coordinated by curb manufacturer and general contractor and mechanical contractor prior to fabrication.
- 4.01 Shop drawings bearing roofing manufacturers and architects approval shall be used for fabrication of the curbs.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDES

- A. Coping, parapet, and cap flashing.
- B. Scuppers and Downspouts.
- C. Roof and still flashings.

1.02 RELATED WORK

- A. Section 06114- Wood blocking, nailers, and grounds.
- B. Section 07514- Built-up Asphalt Roofing: Roofing.
- C. Section 07900- Joint Sealers
- D. Section 09900- Painting: Prime and finish Painting.
- E. Division 15- Mechanical Flashing sleeves and collars for mechanical items protruding through roofing membrane.
- F. Division 16- Electrical: Flashing sleeves and collars for electrical.

1.03 REFERENCES

- A. AA (Aluminum Association)- Aluminum construction Manual: Aluminum Sheet Metal Work and building Construction.
- B. AISI (American Iron and Steel Institute)- Stainless Steel- Uses in Architecture.
- C. ANSV ASTM B 32- Solder Metal.
- D. ASTM A167- Stainless and Heat-resisting Chromium-Nickel Steel Plate.
- E. ASTM B209- Aluminum and Aluminum Alloy Sheet and Plate.
- F. ASTM B307- Copper Sheet and Strip for Building Construction.
- G. FS 0-G-506- Flux, Soldering, Paste and Liquid.
- H. ASTM B32-89- Solder; Tin Alloy.
- I. FS Q-T-201- Terne Plate, for Roofing and Roofing Products.
- J. ASTM D4586- Cement, Bituminous, Plastic.
- K. NAAMM- Metal Finishes Handbook.
- L. NRCA (National Roofing Contractors Association)- Roofing Manual.
- M. SMACNA_ Architectural Sheet Metal Manual.

1.04 SYSTEM DESCRIPTION

- A. Work of this Section is to physically protect membrane roofing; and base flashing, from damage that would permit water leakage to building interior.
- B. Provide scuppers and downspouts to direct water from roof of buildings.

1.05 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing work with three years minimum experience.

1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01300.
- B. Describe material profile, joining pattern, jointing details, fastening methods, and installation details.
- C. Submit manufacturer's installation instructions under provisions of Section 01300.
- D. Submit samples under provisions of Section 01300.

1.07 STORAGE AND HANDLING

- A. Store products under provisions of Section 01600.
- B. Describe material profile, jointing pattern, jointing details, fastening methods, and installation details.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 PRODUCTS

- A. Fasteners: Galvanized steel: ASTM A525, G90; 22 gage core steel, mill phosphitized for painting.
- B. Underlayment: ASTM D266; No. 15 asphalt saturated roofing felt placed on top of roof membrane and strip in flashing.
- C. Protective Backing Paint: Bituminous.
- D. Butyl Tape: Provide at all fasteners in concealed locations.
- E. Sealant: Type specified in Section 07900 and recommended by manufacturers of various products.
- F. Bedding Compound: Rubber- asphalt.
- G. Plastic Cement: ASTM B4586, Type II- Asphaltic base Cement.
- H. Reglets: Surface mounted galvanized steel.
- I. Solder: ANSI/ASTM B32; 50/50 type.
- J. Flux: FS 0-F-506.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set, cant strips and reglets in place and nailing strips located.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.
- C. Beginning of installation means acceptance of existing conditions.

3.02 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install surface mounted reglets true to line and levels.
- C. Insert flashings into reglets to form tight fit. Secure in place in accordance with SMASNA guidelines for particular type of flashing. Seal flashing into reglet with sealant.
- D. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.
- E. Place butyl tape behind all metal flashings at location through which fasteners are placed.
- F. Apply plastic cement compound between metal flashing and felt flashings.
- G. Fit flashing tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.03 INSTALLATION

- A. Conform to drawing details included in SMACNA and NRCA manuals.

END OF SECTION

SECTION 07900

BUILDING SEALANTS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Exterior sealants and sealants for moving joints, except for joints in those systems listed under Related Work.
- B. Interior sealants and caulking.

1.2 RELATED WORK

- A. Section 02520 – Concrete Paving: site concrete paving expansion joint sealant
- B. Section 04200 – Unit Masonry: masonry control and expansion joints
- C. Division 7 – Roofing Sections: Sealants used in conjunction with roofing.
- D. Section 07270 – Firestopping: firestopping penetrations
- E. Section 07620 – Sheet Metal Flashing, Gutters, Downspouts and Trim: Sealants used in conjunction with metal items.
- F. Section 08800 – Glazing Systems: glazing sealants
- G. Section 09250 – Gypsum Board assemblies: acoustical sealants
- H. Division 15 – Mechanical Sections

1.3 REFERENCES

- A. ASTM International (ASTM)
 - 1. C717, Standard Terminology of Building seals and Sealants
 - 2. C793, Standard Test Method for Effects of Accelerated Weathering on Elastomeric Joint Sealants
 - 3. C794, Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - 4. C834, Standard Specification for Latex Sealants
 - 5. C920, Standard Specification for Elastomeric Joint Sealants
 - 6. C1193, Standard Guide for Use of Joint Sealants
- B. Sealant, Waterproofing and Restoration Institute (SWRI)
 - 1. The Processional's Guide

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. Sample: On site sample for Architect's approval of colors.
- C. Certification: Manufacturer's affidavit that materials used in Project contain no asbestos.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: experienced in building sealant installation whose work has resulted in sealant installations with a record of successful performance.
- B. Source Limitations: unless specifically indicated, obtain each type of building sealant through one source from a single manufacturer.
- C. Pre-construction Field Adhesive Testing: Prior to installation of building sealants, field test their adhesion to joint substrates in accordance with manufacturer's instructions. Perform test in locations indicated by Architect. Perform test for each type of building sealant and each substrate as required by Architect. If required by Architect, arrange for tests to be performed with sealant manufacturer's representative present. Follow-up review by Architect and manufacturer may be required to observe sealant performance over time and may result in re-application of sealant or replacement.
- D. Cleaning: Façade sealants that have collected dirt at the time of Substantial Completion shall be cleaned over the entire façade prior to acceptance by the Owner. 11 months after final completion of the building, if the sealant joints show dirt, they shall again be cleaned over the entire façade.

1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of sealants when joint substrates are wet or when ambient temperature conditions are above limits permitted by sealant manufacturers or are below 40 degree F.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of sealants until contaminates which may interfere with adhesion are removed from substrates.

1.7 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements.
- B. In addition, refer to information above concerning Field Adhesive Testing.

1.8 WARRANTY

- A. Warrant the work specified herein for two (2) years against becoming unserviceable or causing and objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to:
 - 1. Leaking
 - 2. Cracking, splitting or releasing from substrate

3. Deterioration or color change

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Specifications are based on the products or materials of the named manufacturer, otherwise selection may be made from any manufacturer listed below whose products meet or exceed the specifications. Other manufacturers must have a minimum of five (5) years experience manufacturing the products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.
 1. Typical Sealants:
 - a. Bostik
 - b. Pecora, Inc.
 - c. Sonneborn
 - d. Sika
 - e. Tremco Incorporated
 2. Silicone Sealants at Appliances:
 - a. Pecora, Inc.
 - b. General Electric Co.
 - c. Dow Corning

2.2 MATERIALS

- A. Caulking for Exposed Non-Working Interior Locations:
 1. Type: Acrylic Latex, conforming to ASTM C834; single component, paintable.
 2. Applications: Use for interior wall and ceiling joints, joints between door and window frames and wall surfaces, and other interior non-traffic-bearing joints for which no other type of sealant is indicated.
- B. Sealant for Working Joints and Exposed Vertical Exterior Locations:
 1. Type: Polyurethane, conforming to ASTM C920, Type M, Grade NS, Class 25; multi-component, non-sagging.
 2. Applications: Use for:
 - a. Control, expansion, and soft joint masonry. Refer to drawings and Section 04200, Unit Masonry for specific locations. Provide full sealant joints at building expansion joints.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior non-traffic bearing joints for which no other type of sealant is indicated.
- C. Sealant for Exposed Exterior Traffic-bearing Locations:
 1. As specified in section 02520, Concrete Paving
- D. Acoustical Sealant:
 1. As specified in Section 09250, Gypsum Board Assemblies
- E. Rubber Sealant:
 1. Type: Butyl sealant, conforming to ASTM C920, Type NT, Grade NS, Class 12-1/2; single component, solvent release, non-skinning, non-sagging.
 2. Movement Capability: Plus and minus 12-1/2 percent
 3. Service Temperature range: -13 to 180 degree F

- F. Sealant at Sanitary Locations:
1. Type: Single component, silicone sealant conforming to ASTM C920, Type S, Grade NS, Class 25, mildew resistant, non-yellowing.
 2. Application: Use for joints between plumbing fixtures and floor and wall surfaces, and joints between kitchen and bathroom counter tops and wall surfaces, unless indicated otherwise. Use at all Kitchen appliances.
 3. See Section 09310, Ceramic Tile for sealant at tile surfaces.
 4. Approved Product/Manufacturer: Sanitary SCS1700 Sealant manufactured by General Electric Company, Pecora Corp., Dow Corning, or Architect approved equal.
- G. Primers, Cleaners, Top Coats: Use only materials listed as suitable in resistance to staining, compatibility and durability before proceeding.
- H. Expanded Polysthylene Joint Filler: Provide flexible, compressible, closed-cell, polyethylene of not less than 10 psi compression deflection (25 percent); except provide higher compression deflection strength as many be necessary to withstand installation forces and provide proper support for sealants, surface water absorption of not more than 0.1 pounds per square foot, as manufactured by Sonneborn, or pre-approved equal.
- I. Sealant Backer Rod: Provide compressible rod stock of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant. Where used with hot-applied sealant, provide heat-resistant type, which will not be deteriorated by sealant application temperature as indicated.
- J. Bond Breaker Tape: Provide polyethylene tape or other plastic tape as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

PART 3 – EXECUTION

3.1 APPLICATION

- A. Temperatures: Do not install sealants when air temperature is under 40 degrees F. Sealants may be warmed to ease installation when recommended by the manufacturer.
- B. Tooling: Toll exposed joints to a slightly concave surface using slicking materials recommended by the manufacturer. The tooling procedure shall press sealant against the sides of the groove. No materials shall be left "feathered" out or smeared on the abutting materials. If necessary, protect adjacent surfaces with tape. Completed joints shall have a uniform professional appearance. Use an anti-tack compound on sealant that does not set up fast enough to avoid dust collection.
- C. Sealant Back-Up: Provide back-up filler where groove depth is too great to fill with sealant. Review joint design with Architect.
- D. Compressive Filler: Seal vertical expansion joints with fillers. Provide compressible filler twice the width of the joint and with a depth of 1-1/2 times the compressed width. Lap ends 2 inch minimum.

- E. Seal ends together in such a manner to allow natural drainage. Install filler by compressing material and sliding into joint. Align filler on one face of the joint before it expands to the full joint width.

END OF SECTION

SECTION 08100

HOLLOW METAL DOORS AND FRAMES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Provide items shown on the drawings and specified, including, but not limited to the following:
 - 1. Standard and fire rated steel doors
 - 2. Steel frames for doors, sidelites, transoms, and windows
 - 3. Louvers and vision lites in steel doors, if shown or required
 - 4. Sound rated steel doors
 - 5. Thermally rated steel doors

1.2 RELATED WORK

- A. Section 04200 – Unit Masonry
- B. Section 05410 – Light Gauge Steel Framing
- C. Section 05500 – Miscellaneous Metals
- D. Section 08213 – Plastic Laminate Faced Wood Doors
- E. Section 08710 – Finish Hardware
- F. Section 08800 – Glazed Systems: Glazing in doors, sidelites, transoms, and windows
- G. Section 09900 – Painting and Staining

1.3 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. A115.IG, Installation Guide for Doors and Hardware
 - 2. A224.1, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors & Frames
 - 3. A250.8, Recommended Specifications for Standard Steel Doors and Frames. (Formerly SDI-100)
 - 4. A250.11, Recommended Erection Instructions for Steel Frames (Formerly SDI-105).
- B. ASTM International (ASTM)
 - 1. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - 3. A1008, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
 - 4. A1011, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon,

- Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- 5. C1363 – Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus
- 6. E413 – Standard Classification for Rating Sound Insulation
- 7. E2074, Standard Test Method for Fire Tests of Door Assemblies (Formerly A152)
- C. Federal Specification (Fed Spec)
 - 1. Fed Spec C578 Bead Fusion Test
- D. Hollow Metal Manufacturers Association (HMMA)
 - 1. HMMA 802 – Manufacturing of Hollow Metal Doors and Frames.
 - 2. HMMA 810 – Hollow Metal Doors
 - 3. HMMA 830 – Hardware Preparation and Locations for Hollow Metal Doors and Frames
 - 4. HMMA 840 – Installation and Storage of Hollow Metal Doors and Frames
 - 5. HMMA 850 – Fire Rated Hollow Metal Doors & Frames
 - 6. HMMA 890 – Technical summary of Hollow Metal by HMMA
- E. National Fire Protection Association (NFPA)
 - 1. 80, Fire Doors and Fire Windows
 - 2. 252, Fire Tests of Door Assemblies
- F. Steel Door Institute
 - 1. Technical Data Series
- G. Underwriters Laboratories Inc. (UL)
 - 1. Building Materials Directory
 - 2. Listing and Labeling
 - 3. 10B and 10C, Fire Tests of Door Assemblies
 - 4. 1784, Air Leakage Tests of Door Assemblies
- H. Intertek Testing, Services (Warnock Hersey, Inc. (WHI))
 - 1. Listing and Labeling

1.4 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's standard details and catalog data demonstrating compliance with specifications and referenced standards.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings:
 - 1. Indicate complete schedule in detail for each steel door and frame using the same reference number for details and openings as those on the Contact Drawings. If any door is not by the steel door manufacturer only the door opening number should be shown along with the type of door (wood, plastic laminate faced, etc.).
 - 2. Show details of construction, installation, connections, anchors, hardware reinforcement, hardware preparation, louvers, and floor and threshold clearances.
- C. Samples:

1. 12 inch x 12 inch sample of a fire-rated and non-rated door, cut from corner of door, showing door construction.
 2. 12 inch x 12 inch sample of each type of door louver specified or required, showing louver construction.
 3. 6 inch long sample of a fire-rated, non-rated frame, and each type of glass stop specified or required, showing corner and construction.
- D. Certificates:
1. Manufacturer's certification that oversized openings are in compliance with specifications.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: If other than a manufacturer listed under Paragraph 2.1 is proposed for use on the Project, it shall be a company specializing in the manufacturer of steel doors and frames of the type specified for this Project with a minimum of five (5) years experience.
- B. All steel doors and frames shall be by a single manufacturer.

1.6 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies:
1. Fire-Rated Door, Panel, Frame, and Fire Window Construction: Shall conform to ASTM E2074, NFPA 252, or UL 10B, as applicable, and acceptable to the code authorities having jurisdiction.
 2. Fire-Rated Door Construction:
 - a. Notwithstanding any other requirements of this Specification, provide gauge of metal, method of construction, hardware preparation, reinforcement, and placement, glass opening size, and other specifics required to obtain the specified or required label. The label shall contain the fire resistance rating (20 minute, 45 minute, 1 hour, 1-1/2 hour, 3 hour, etc.) and the designation (A, B, C, D, or E). Doors with "B" Label shall be 1-1.2 hour.
 - b. Fire-rated doors used in a stairway enclosure, shall be so constructed so that the maximum transmitted temperature shall not exceed 450 degrees F above ambient temperature at the end of 30 minutes of the Standard Fire Exposure Test and Shall be so noted on the label.
 3. Fire-Rated Openings: Conform to NFPA 80 for fire-rated class shown or required by code authorities having jurisdiction.
 - a. Units shall be identical to assemblies whose fire resistance characteristics have been determined in accordance with requirements specified under Paragraph C, 01, above, and shall be labeled and listed by UL, WHI, or other inspection and testing agency acceptable to the code authorities having jurisdiction.
 - b. Fire-rated steel doors, panels, frames, and fire windows shall bear permanent labels attesting to fire resistance. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 20 minutes of exposure.
 - c. Oversized openings shall be constructed in accordance with all applicable requirements for labeled door construction.
 - d. Fire rated door assemblies with gaps in excess of 1/8 inch between door and frame will not comply with NFPA 80.

- e. Locate label on hinge side of doors and frames so that when door is closed, label is not visible.
- f. Caution shall be taken to ensure that labels are not removed, damaged or painted over.
- g. Glass panes shall not exceed sizes allowed whether indicated or not on the drawings.

1.7 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements.

1.8 COORDINATION

- A. Coordinate the Work of this Section with work in which hollow metal work is installed.
- B. Coordinate hardware installation with opening construction. Finish hardware is specified in Section 08710.
- C. Coordinate doors, frames, and windows with glazing specified in Section 08800.
- D. Coordinate doors and frames with painting specified in Section 09900.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store products in accordance with manufacturer's instructions, and as follows:
- B. Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.
- C. Protect products for moisture, construction traffic, and damage.
 - 1. Store under cover in a clean, dry place, protected from weather and abuse.
 - 2. Store in a manner that will prevent rust or damage.
 - 3. Store doors in a vertical position, spaced with blocking to permit air circulation.
 - 4. Do not use non-vented plastic or canvas shelters.
 - 5. Should containers or wrappers become wet, remove immediately.

1.10 WARRANTY

- A. Warrant the work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.
- B. Defects Shall include, but not be limited to:
 - 1. Use of incorrect materials in opening
 - 2. Incorrect labeled components installed within opening
 - 3. Noisy, rough or difficult operation
 - 4. Failure to meet specified quality assurance requirements

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers listed below whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must comply with Paragraph 1.5, A, Manufacturer Qualifications, must manufacture equivalent products to those specified and comply with requirements of Division 1 regarding substitutions to be considered.
1. Amweld Building Products, Inc., Garrettsville, OH; (330) 527-5122
 2. American Door Products, Houston, TX; (713) 681-8047 (Pearland Industries, Inc.)
 3. CECO Door Products, Brentwood, TN; (615) 661-5030
 4. Curries Company, Mason City, IA; (515) 423-1334
 5. Deansteel Mfg. Co., San Antonio, TX; (210) 226-8271
 6. Door Pro Systems, Inc., Houston, TX; (713) 462-0860
 7. P-W Metal Products, Inc., Garland, TX; (214) 487-0454
 8. Republic Builders Products Company, McKenzie, TN; (800) 733-3667
 9. Rocky Mountain Metals, Inc., Raton, NM; (505) 445-2756
 10. Steelcraft Mfg. Co., Cincinnati, OH; (513) 745-6400

2.2 MATERIALS, GENERAL

- A. Steel requirements, all frames to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel per ASTM-A1008 general requirements. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A1011.
- B. Exterior frames and interior frames where shown on drawings or required in damp, moist, humid, and wet areas, i.e., toilets, locker rooms, showers, etc., to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel and galvanized to 'A-60' minimum coating weight standard per ASTM-A653 and A924, with coating weight of not less than 0.60 ounce per square foot (0.30 ounce per square foot per side).

2.3 FRAME FABRICATION

- A. Minimum Gauges:
1. Interior Openings:
 - a. 4 feet-0 inches or Less in Width: 16 gauge
 - b. Over 4 feet-0 inches in Width: 14 gauge
- B. Design and Construction:
1. Frames shall be custom made, welded units with integral trim of sizes and shapes shown on approved shop drawings. Hinge jambs that butt adjacent 90 degree walls shall have at least four (4) inch wide frame face to assure the door trim will not strike the wall prior to the door opening at least 90 degrees. Frame profile shall match wall thickness where practical, i.e., 4-3/4 inch at 4 inch CMU, 6-3/4 inch at 6 inch CMU, and 8-3/4 inch at 8 inch CMU. At masonry wall openings, fabricate frames to suite masonry opening with 2 inch head member.
 2. Frames shall be strong and rigid, neat in appearance, square, true and free of defects, warp and buckle. Molded members shall be clean cut, straight and of uniform profile throughout their length.
 3. Jamb depths, trim, profile and backbends shall be as shown on approved shop drawings.
 4. Corner joints, including face and inside corners, shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops butted. The use of gussets shall not be permitted. Face of frame shall be ground smooth. Knockdown (KD) frames are not permitted.
 5. Minimum depth of stops shall be 5/8 inch, except at fire windows where minimum depth of stops shall be 3/4 inch.

6. Frames for multiple openings shall have mullion and rail members which are closed tubular shapes having no visible seams or joints. Joints between faces of abutting members shall be securely welded and finished smooth. Mullions shall be key locked removable type. Keys shall be master keyed to Owner's Best system.
 7. Hardware Reinforcements:
 - a. Frames shall be mortised, reinforced, drilled and tapped at factory for fully template mortised hardware in accordance with approved hardware schedule and templates provided by Section 08710. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only.
 - b. Minimum thickness of hardware reinforcing plates shall be as follows:
 - 1) Hinge and pivot reinforcements (1-1/4 inch x 10 inch minimum size): 7 gauge
 - 2) Strike reinforcements: 12 gauge
 - 3) Flush bolt reinforcements: 12 gauge
 - 4) Closer reinforcements: 12 gauge
 - 5) Reinforcements for surface-mounted hardware, hold-open arms, surface panic devices: 12 gauge
 8. Floor Anchors: Minimum 14 gauge, securely welded inside each jamb, with holes for floor anchorage.
 9. Jamb Anchors:
 - a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-Strap type. Anchors shall be not less than 16 gauge steel. The number of anchors provided at each jamb shall be as follows:
 - 1) Frames up to 7 feet-6 inch height – Three (3) anchors
 - 2) Frames 7 feet-6 inch to 8 feet-0 inch height – Four (4) anchors
 - 3) Frames over 8 feet-0 inch height – One (1) anchor for each 2 feet or fraction thereof in height.
 - b. Frames for installation in wood or metal stud partitions shall be provided with steel anchors of suitable approved design, not less than 16 gauge thickness, securely welded inside each jamb as follows:
 - 1) Frames up to 7 feet-6 inch height – Four (4) anchors
 - 2) Frames 7 feet-6 inch to 8 feet-0 inch height – Five (5) anchors
 - 3) Frames over 8 feet-0 inch height – Four (4) anchors plus one (1) additional for each 2 feet or fraction thereof over 8 feet-0 inches.
 - c. Frames to be anchored to previously placed concrete, masonry or structural steel shall be provided with anchors of suitable design as shown on approved shop drawings.
 10. Dust Cover Boxes: Shall be of not less than 26 gauge steel and shall be provided at all mortised hardware items. Eight (8) inch CMU walls with face brick shall have dual offset jamb anchors.
 11. Steel Spreader: Shall be provided on all frames, temporarily attached to bottoms of both jambs for bracing during shipping and handling.
 12. Loose Glazing Stops: Shall be of cold rolled steel, not less than 20 gauge, butted at corner joints and secured to the frame with countersunk cadmium or zinc-plated screws. Loose stops at exterior frames shall be placed on the exterior side of the frames, unless otherwise shown.
 13. At sound rated door openings and at masonry openings, coat inside of frame profile with bituminous coating to minimum thickness of 1/16 inch.
- C. Frame Color: Field painted under Section 09900 to match face of door.

2.4 DOOR FABRICATION

- A. Minimum Gauges:
 - 1. Interior Doors: 0.053 inch or 18 gauge
 - 2. Exterior Doors: 0.042 inch or 16 gauge
- B. Design and Construction:
 - 1. Types: Doors shall be custom fabricated, of types and sizes shown on approved shop drawings, and shall be fully welded seamless construction with no visible seams or joints on faces or vertical edges.
 - 2. Thickness: Shall be 1-3/4 inch, unless specifically noted or shown otherwise.
 - 3. Fabrication:
 - a. Doors shall be strong, rigid and neat in appearance, free from warpage and buckle.
 - b. Corner bends shall be true and straight and of minimum radius for gage of metal used.
 - c. Provide 22 gauge steel stiffeners spaced maximum six (6) inches on center and extending full height of door.
 - d. Fill interior with noncombustible fiberglass insulation. Use mineral board filler as required for labeled doors.
 - e. Faces shall be joined at vertical edges of door by a continuous weld extending full height of door. Welds shall be ground, filled and dressed smooth to provide a smooth flush surface.
 - f. Top and bottom edges of doors shall be closed with a continuous recessed steel channel not less than 16 gauge, extending full width of door and spot weld to both faces. Exterior doors shall have an additional flush closing channel at top and bottom edges. Openings shall be provided in the bottom closure channel at top and bottom edges. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
 - g. Doors within in wet or humid areas shall have a top cap and solid foam interior core to prevent internal moisture accumulation.
 - h. Edge profile shall be provided on both vertical edges of door as follows:
 - 1) Single-Acting Swing Doors: Beveled 1/8 inch in 2 inches.
 - i. Hardware Reinforcements:
 - 1) Doors shall be mortised, reinforced, drilled and tapped at factory for fully template hardware, in accordance with the approved hardware schedule and templates provided by Section 08710. Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only.
 - 2) Minimum gauges for hardware reinforcing plates shall be as follows:
 - a) Hinge & pivot reinforcements: 7 gauge
 - b) Reinforcements for lock face, flush bolts, concealed holders, concealed on surface-mounted closers: 12 gauge
- C. Finish:
 - 1. Shop paint Steel (whether galvanized or ungalvanized) stops and accessories as follows:
 - a. Clean surfaces free of mill scale, rust, oil, grease, dirt and other foreign matter.
 - b. Chemically treat surfaces and apply one (1) coat of an approved backed-on rust-inhibitive primer paint to provide a minimum 0.5 mil dry film thickness.

2 Field painted under Section 09900.

2.5 LABELED DOORS AND FRAMES

- A. Labeled doors and frames shall be provided for openings requiring fire protection ratings as scheduled and to comply with NFPA 80. Such doors and frames shall be constructed as tested and approved by UL, WHI, or other nationally recognized testing agency having a factory inspection service and approved by code authorities having jurisdiction and shall bear the appropriate permanent label.
- B. If any door or frame scheduled to be fire-rated cannot qualify for appropriate labeling because of its size, design, hardware or other reason; the Architect shall be so advised before fabrication work on that item is started.

PART 3 – EXECUTION

3.1 INSTALALTION

- A. Separate dissimilar metal. Protect against galvanic action.
- B. Frames:
 - 1. Anchorage and Connections: Secure to adjacent construction. Where practical, interior door frames shall be flush with the pull side wall to minimize or eliminate the reveal and allow full 180 degree door swing.
 - 2. Install frames in accordance with manufacturer's instructions and install labeled frames in accordance with NFPA 80.
 - 3. Frame Spreader Bars: Leave intact until frames are set perfectly square and plumb and anchors and securely attached.
 - 4. Remove hardware, with the exception of prime-coated items, tag box, and reinstall after finish paint work is completed. Do not remove or paint over labels on labeled frames.
- C. Doors:
 - 1. Install hardware in accordance with hardware manufacturer's templates and instructions.
 - 2. Install doors in accordance with manufacturer's instructions and install labeled doors in accordance with NFPA 80.
 - 3. Adjust operable parts for correct function.
 - 4. Remove hardware, with the exception of prime-coated items, tag, box, and reinstall after finish paint work is completed. Do not remove or paint over labels on labeled doors.

3.2 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces.
- C. Remove scraps and debris, and leave site in clean condition.

END OF SECTION

SECTION 08300

SPECIAL DOORS

PART 1 GENERAL

1.1 DESCRIPTION:

- A. Work Included: Special doors required for this work include but are not limited to, roll-up and sliding wire mesh doors.

1.2 QUALITY ASSURANCE:

- A. Qualification of Installers: Use only personnel thoroughly trained and experienced in installation of the selected products and who are completely familiar with the requirements of this work.
- B. Manufacturer's Certification: Prior to start of installation, secure a visit to job site by the manufacturer's representative who shall inspect and certify that:
 - 1. Openings in which special doors are to be installed are suitable for that installations.
 - 2. Installed doors comply in all respects with requirements of these specifications.
- C. Acceptable Manufacturers: Product description is based upon the designated manufacturer. Other manufacturers as indicated are acceptable provided they provide all the listed design criteria.

1.3 SUBMITTALS:

- A. Submit shop drawings as required by Section 01340 before any special doors are delivered to the job site.

1.4 PRODUCT HANDLING:

- A. Protection: Protect special doors, the installed work and materials of installation.
- B. Replacements: In event of damage, make all repairs and replacements necessary to Architect's approval and at no additional cost to Owner.

PART 2 PRODUCTS

2.2 SLIDING WIRE MESH DOORS:

- A. Description:
 - 1. Mesh
 - a. Thickness: 10ga. (.135)
 - b. Design: 2 1/8" x 1 1/8" (center to center) rectangular woven wire (2"x1"actual opening)
 - 2. Panels
 - a. Frame: 1 1/4" x 1 1/4" x 1/8" Angle
 - b. Fabrication: Mesh is securely welded to frame with flat steel stiffeners welded to frame behind mesh panels longer than 3'-6".
 - c. 12'-0"w x 5'-0"h maximum size
 - 3. Doors
 - a. Frame: 1 1/4" x 1 1/4" x 1/8" Angle
 - b. Fabrication: Mesh is securely welded to frame with flat steel stiffeners welded to frame for extra strength where needed.
 - c. Complete with two door posts, two 4 wheel trolley trucks, 16 gauge track, and all hardware.
 - 4. Post
 - a. Material: 2" x 2" x #14ga. Square Tubing
 - b. Fabrication: 1/4" x 2" x 7" plate welded at base of post.
 - 5. Hardware
 - a. Shall be 3/8" standard thread grade two plated for panel connections.

- b. Door hardware shall be 1/4" x 1" self drilling screws.
 - c. 3/8" floor anchors and all other hardware furnished with each job.
- 6. Finish
 - a. Architect to select from full range of available optional in-stock colors.

B. Manufacturer:

- 1. **WireCrafters**, 6208 Strawberry Lane, Louisville, KY 40214
Phone: 877-924-9473 **Fax:** 502-361-3857 **Email:** info@wirecrafters.com
- 2. Substitutions permitted by Section 01600

PART 3 EXECUTION

3.1 SURFACE CONDITION:

- A. Inspection: Prior to installation, inspect installed work and verify that conditions are proper to commerce installation.
- B. Discrepancies: Do not proceed with installation until all discrepancies have been fully resolved.

3.2 INSTALLATION:

- A. Install in accordance with pertinent codes, regulations, original design, approved shop drawings and manufacturers current recommendations.
- B. Anchor all components firmly into position for long life under hard use.

3.3 TOUCHING UP:

- A. Touch up all scuffs and abrasions in priming coat.

3.4 INSTRUCTIONS:

- A. Instruct Owner's maintenance and operation personnel in operation and maintenance of all special doors.

END OF SECTION

SECTION 08360
SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed Aluminum Sectional Overhead Doors
- B. Electric Operators and Controls.
- C.
- D. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.
- B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.
- C. Section 05500 - Metal Fabrications: Steel frame and supports.
- D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.
- E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.
- F. Section 08710 - Door Hardware: Cylinder locks.
- G. Section 11150 – Parking Control Equipment: Remote door control.
- H. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.
- I. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

- A. [ANSI/DASMA 102](#) - American National Standard Specifications for Sectional Overhead Type Doors.

1.4 DESIGN / PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - 1. Design pressure of 30 lb/sq ft
- B. Wiring Connections: Requirements for electrical characteristics.
 - 1. 115 volts, single phase, 60 Hz.
- C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weather tight location.

1.8 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: sales@overheaddoor.com.
- A. Acceptable Manufacturer: Raynor, located at: 1101 East River Rd. P. O. Box 448 ; Dixon, IL 61021-0448; Toll Free Tel: 800-4-RAYNOR; Tel: 815-288-1431; Fax: 888-598-4790; Email: request info; Web: www.raynor.com

- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

- A. Glazed Sectional Overhead Doors: 521 Series Aluminum Doors by Overhead Door Corporation, or AV200 Series by Raynor

1. Door Assembly: Stile and rail assembly secured with 1/4 inch (6 mm) diameter through rods.
 - a. Panel Thickness: 1-3/4 inches (44 mm).
 - b. Center Stile Width: 2-11/16 inches (68 mm)
 - c. End Stile Width: 3-5/16 inches (84 mm)
 - d. Intermediate Rail Pair Width: 3-11/16 inches (94 mm).
 - e. Top Rail Width:
 - 1) 2-3/8 inches (60 mm).
 - 2) 3-3/4 inches (95 mm).
 - f. Bottom Rail Width:
 - 1) 3-3/4 inches (95 mm).
 - 2) 4-1/2 inches (114 mm).
 - g. Aluminum Panels: 0.050 inch (1.3 mm) thick, aluminum.
 - h. Stiles and Rails: 6063 - T6 aluminum.
 - i. Springs:
 - 1) 100,000 cycles.
 - j. Glazing:
 - 1) 1/4 inch (6 mm) Low E glazing.
2. Finish and Color:
 - a. Anodized Finish: Clear anodized.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
5. Lock: Interior galvanized single unit.
6. Weatherstripping:
 - a. Flexible bulb-type strip at bottom section.
 - b. Flexible Jamb seals.
 - c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
8. Manual Operation: Chain hoist.
9. Electric Motor Operation: Provide UL listed electric operator, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second. Operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
 - a. Entrapment Protection: Required for momentary contact, includes radio control operation.
 - 1) Electric sensing edge monitored to meet UL 325/2010.
 - 2) Photoelectric sensors monitored to meet UL 325/2010.
 - b. Operator Controls:
 - 1) Push-button and key operated control stations with open, close, and stop buttons.
 - 2) Flush mounting.
 - 3) Interior location.
 - c. Special Operation:
 - 1) Radio control operation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.
- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.
- F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING

- A. Adjust door assembly to smooth operation and in full contact with weather stripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

END OF SECTION

SECTION 08625
TUBULAR DAYLIGHTING DEVICE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tubular daylighting device, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.

1.2 RELATED SECTIONS

- A. Section 07311 - Asphalt Shingles: Flashing of skylight base.
- B. Section 07320 - Roof Tiles: Flashing of skylight base.
- C. Section 07600 - Flashing: Metal flashings.
- D. Section 07611 – Prefabricated Metal Building Roof Curbs
- E. Section 08620 - Unit Skylights: Skylights without reflective tube.
- F. Section 15810 - Ducts: Fan vent duct and connections.
- G. Section 16150 - Equipment Wiring: Electrical connections.

1.3 REFERENCES

- A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.
- C. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.
- E. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- F. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.
- G. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.
- H. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.
- I. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain

Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

- J. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.
- K. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.
- L. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).
- M. UL 181 - Factory Made Air Ducts and Air Connectors
- N. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.
- O. Florida Building Code TAS 201 – Impact Test Procedures.
- P. Florida Building Code TAS 202 – Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.
- Q. Florida Building Code TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading

1.4 PERFORMANCE REQUIREMENTS

- A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
 - 1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
 - 2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.
 - 3. Uniform Load Test:
 - a. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).
 - b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
 - 4. Hurricane Resistance:
 - a. Meets Florida Building Code TAS, 201, TAS, 202 and TAS 203 for Impact and non impact components.
 - b. Meets ASTM E 1886 and ASTM E1996 for missile and cyclic pressure differential testing.
 - 5. Fire Testing:
 - a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.
 - b. Self-Ignition Temperature - Greater than 650 degrees F per ASTM D-1929.
 - c. Smoke Density - Rating no greater than 450 per ASTM Standard E 84 in way intended for use. Classification C.
 - d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min

- (62 mm/min) Classification CC-2 per ASTM D 635.
- e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per ASTM D 635.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.
- D. Verification Samples: As requested by Architect.
- E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 15 years.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc., which is located at: 2210 Oak Ridge Way ; Vista, CA 92081; Toll Free Tel: 888-765-2882; Tel: 760-477-1120; Email: [request info \(commsales@solatube.com\)](mailto:request info (commsales@solatube.com)); Web: www.solatube.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 TUBULAR DAYLIGHTING DEVICES

- A. Tubular Daylighting Devices General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly,

transferring sunlight to interior spaces; complying with ICC AC-16.

- B. Skyvault Series: Solatube Model SM74 DS Open Ceiling Ceiling, 28.5 inch and 290 DS Penetrating Ceiling 14 inch Daylighting System:
1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - a. Outer Dome Glazing: Type DP, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV C), impact modified acrylic blend.
 - b. Raybender 3000 (for 290 DS): Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 - c. Inner Dome Glazing: Type DPP, 0.115 inch (3 mm) minimum thickness polycarbonate classified as CC1 material.
 - d. Seals:
 - 1) Inner Dome Seal: Adhesive back closed cell foam seal 0.125 inch (3.2 mm) or 0.188 inch (4.8 mm) tall by 0.375 inch (9.5 mm) wide.
 - 2) Dome Assembly Seal: Adhesive backed pile weather-strip, 0.350 inch (8.9 mm) tall by 0.187 inch (4.8 mm) wide.
 2. Curb Cap Flashing Base: One piece, seamless, leak-proof flashing and base support for dome and top of tube and cap flashing. Fabricated of galvanized steel, conforming to ASTM A 653/A 653M or ASTM A 463/A 463M or ASTM A792/A 792M, with a thickness of 0.0276 inch (0.7 mm) plus or minus .004 inch (.01 mm).
 - a. Base Style: Type FC, Curb-cap, with inside dimensions of 35.5 inches by 35.5 inches (902 mm by 902 mm) to cover curb specified in Section 07600.
 - b. Insulation: Nominal 1-inch thick thermal isolation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 (OFxft2xhr/Btu) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, & HFC free blowing agent. Type-1 Class-1 per ASTM C1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2
 - c. Curb Seal: Includes a double bead of adhesive backed closed cell foam seal 0.188 inch (4.8mm) tall by 0.375 inch (9.5mm) wide to reduce air infiltration.
 3. Dome Seal: Adhesive backed weatherstrip 0.63 inch (16 mm) tall by 0.28 inch (7 mm).
 4. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm).
 - a. General:
 - 1) Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 80.2 percent.
 - 2) Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 - b. Top Tube Angle Adapter and Bottom Top Tube Angle Adapter Kit, Type AK:
 - 1) Reflective 45 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long
 - c. Extension Tube:
 - 1) Reflective extension tube, Type EXX, Notched for Open Ceiling diffuser attachment, 24 inches (610 mm) long

5. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 290 DS. Ceiling mounted box transitioning from round tube to round ceiling diffuser assembly, supporting light transmitting surface at bottom termination of tube; 14" round to fit hard ceilings.
 - a. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame and EPDM foam seal to minimize condensation and bug, dirt and air infiltration per ASTM E 283. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.
- 6a Diffuser Assembly for Tubes in Opening Ceiling Condition: Solatube Model M74 DS. Amplifier tube mounted to bottom extension tubes. Bottom of diffuser to be mounted no less than 20 feet above the finish floor below to meet 20 foot minimum clearance.
 - a. Lens: Type L2, Prismatic lens designed to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.100 inch (2.5 mm) thick. Classified as CC2.
 - b. Diffuser Seal: "L" shaped EPDM closed cell foam, , 0.86 in (21.8 mm) wide by 1.37 in (34.8mm) tall by 0.16 in (4.1 mm) thick to minimize condensation and bug, dirt and air infiltration per ASTM E 283.
6. Catalog Number: SM74 DS-0-DPP-SG-FC-E1-A-L2 (21 inch dome)
290 DS-DA-FCM-EXX-L1-I-SW (14 inch dome)

2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.
- D. Local Dimmer Control utilizing a butterfly baffle design of Spectralight Infinity reflective material to minimize shadowing when in use. Provided with dimmer switch and cable.
 1. Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; Maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, 22 gauge cable; providing daylight output between 2 and 100 percent.
 2. Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: A maximum of 10 units can be connected to one switch.
 3. Cable: Type CA, Two conductor, 22 gauge, low voltage cable (500 ft.) for multiple unit DC connections.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

S750 DS-C = SolaMaster® Series Solatube 750 DS-C Closed Ceiling (21 in/530 mm Daylighting System)

DPI = Polycarbonate Inner Dome (Required for High Velocity Wind Zones)

FC = Curb Cap (Curb By Others)

AK = 16" Top Tube Angle Adapter and 16" Bottom Tube Angle Adapter Kit

EXX = Total Run Length to be Determined by Bidding Contractor

L1 = OptiView Diffuser

SECTION 08 71 00FINISH HARDWARE

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Work under this section comprises of furnishing hardware specified herein and noted on drawings for a complete and operational system, including any electrified hardware components, systems, controls and hardware for aluminum entrance doors. Any door shown on the drawing and not specifically referenced in the hardware sets shall be provided with identical hardware as specified on other similar openings and shall be included in the General Contractor's base bid. All fire rated door shall be provided with fire rated hardware as required by local code Authority as part of the General Contractor's base bid. The hardware supplier shall verify all cylinder types specified for locking devices supplied as part of the door system with the door manufacturer and/or door supplies.
 - B. The General Contractor shall notify the Architect in writing of any discrepancies (five (5) days prior to bid date) that could and/or would result in hardware being supplied that is none functional, hardware specified and/or hardware that has not been specified that will result in any code violations and any door that is not covered in this specification. Failure of the General Contractor to address any such issue could be considered acceptance of the hardware specified and all discrepancies could be corrected at the General Contractor's expense.
 - C. Items include but are not limited to the following:
 - 1. Hinges - Pivots
 - 2. Flush Bolts
 - 3. Exit Devices
 - 4. Locksets and Cylinders
 - 5. Push Plates - Pulls
 - 6. Coordinators
 - 7. Closers
 - 8. Kick, Mop and Protection Plates
 - 9. Stops, Wall Bumpers, Overhead Controls
 - 10. Electrified Hold Open Devices
 - 11. Thresholds, Seals and Door Bottoms
 - 12. Silencers
 - 13. Miscellaneous Trim and Accessories
- 1.02 RELATED DOCUMENTS, drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 Specification sections, apply to this section.
- 1.03 RELATED WORK specified elsewhere that should be examined for its effect upon this section:
- A. Section 06 20 00 - Finish Carpentry
 - B. Section 08 11 13 – Steel Doors and Frames
 - C. Section 08 14 16 – Flush Wood Doors
 - D. Sections within 08 31 13 – Access Doors

- E. Section within 08 41 13 – Aluminum Entrances, Storefront and Window Framing
- F. Sections within 08 80 00 – Glass and Glazing
- G. Sections within 09 91 00 - Painting
- H. Division 26 - Electrical

1.04 REFERENCES SPECIFIED in this section subject to compliance as directed:

- A. NFPA-80 - Standard for Fire Doors and Windows
- B. NFPA-101 - Life Safety Code
- C. ADA - The Americans with Disabilities Act - Title III - Public Accommodations
- D. ANSI-A 117.1 - American National Standards Institute - Accessible and Usable Buildings and Facilities
- E. ANSI-A 156.5 - American National Standards institute -Auxiliary Locks and Associated Products
- F. UFAS - Uniform Federal Accessibility Standards
- G. UL - Underwriter's Laboratories
- H. WHI - Warnock Hersey International, Testing Services
- I. State and Local Codes including Authority Having Jurisdiction
- J. U.B.C.7-2-97 and UL10C
- K. IBC-2012 – International Building Code
- L. NFPA-70 International Electrical Code

1.05 SUBMITTALS

- A. HARDWARE SCHEDULES submit copies of schedule in accordance with Division 1, General Requirements. Schedule to be in vertical format, listing each door opening, including: handing of opening, all hardware scheduled for opening or otherwise required to allow for proper function of door opening as intended, and finish of hardware. At doors with door closers or door controls include degree of door opening. Supply the schedules all Finish Hardware within two (2) weeks from date purchase order is received by the hardware supplier.
- B. Submit manufacturer's cut/catalog sheets on all hardware items and any required special mounting instructions with the hardware schedule.
- C. Certification of Compliance:
 - 1. Submit any information necessary to indicate compliance to all of these specifications as required.
 - 2. Submit a statement from the manufacturer that electronic hardware and systems being supplied comply with the operational descriptions exactly as specified.
- D. Submit any samples necessary as required by the Architect.
- E. Templates for finish hardware items to be sent to related door and frame suppliers within three (3) working days of receipt of approved hardware schedule.
- F. Doors and Frames used in positive pressure opening assemblies shall meet U.B.C. 7-2-97 and UL10C in areas where this specification includes Seals for smoke door.

1.06 QUALITY ASSURANCE

- A. Hardware supplier to be a qualified, Factory Authorized, direct distributor of the products to be furnished. In addition, the supplier to have in their regular employment an AHC or AHC /CDC and/or a person of equivalent experience (minimum fifteen (15) years in the industry) who will be made available at reasonable times to consult with the Architect/Contractor and/or the Building Owner regarding any matters affecting the finish hardware on this project.
- B. All hardware used in labeled fire or smoke rated openings to be listed for those types of openings and bear the identifying label or mark indicating UL. (Underwriter's Laboratories) approved for fire. Exit devices in non-labeled openings to be listed for panic.

1.07 DELIVERY, HANDLING AND PACKAGING

- A. Furnish all hardware with each unit clearly marked and numbered in accordance with the hardware schedule. Include door and item number for each.
- B. Pack each item of hardware completes with all necessary parts and fasteners.
- C. Properly wrap and cushion each item to prevent scratches and dents during delivery and storage.

1.08 SEQUENCING AND SCHEDULING

Any part of the finish hardware required by the frame or door manufacturers or other suppliers that is needed in order to produce doors or frames is to be sent to those suppliers in a timely manner, so as not to interrupt job progress.

1.09 WARRANTY

All finish hardware shall be supplied with a One- (1) year warranty against defects in materials and workmanship, commencing with substantial completion of the project except as follows:

- 1. All Closers are to have a ten- (10) year written warranty.
- 2. All Exit Devices (Grade 1) are to have a three- (3) year written warranty.
- 3. All Locksets (Grade 1) are to have a ten- (10) year written warranty.
- 4. All Continuous Hinges are to have a ten- (10) year written warranty.

PART 2 – PRODUCTS

2.01 FASTENERS

- A. Furnish with finish hardware all necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for a long life under hard use.
- B. Furnish fastenings where necessary with expansion shields, toggle bolts and other anchors designated by the Architect according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer. All closers and exit devices on labeled wood doors shall be through-bolted if required by the door manufacturer. All thresholds shall be

fastened with wood screws and plastic anchors. Where specified in the hardware sets, security type fasteners of the type called for are to be supplied.

- C. Design of all fastenings shall harmonize with the hardware as to material and finish.
- D. All hardware shall be installed with the Manufacturers standard screws as provided. The use of any other type of fasteners shall not be permitted. The general contractor shall provide wood blocking in all stud walls specified and/or scheduled to receive wall stops, No Exception.

2.02 ENVIRONMENTAL CONCERN FOR PACKAGING

The hardware shall ship to the job site is to be packaged in biodegradable packs such as paper or cardboard boxes and wrapping.

2.03 HINGES

- A. All hinges to be of one manufacturer as hereafter listed for continuity and consideration of warranty. Provide one of the following manufacturers Ives, Hager or Stanley.
- B. Unless otherwise specified provide five-knuckle, heavy-duty, button tip, full mortise template type hinges with non-rising loose pins. Provide non-removable pins for out swinging doors at secured areas or as called for in this specification (Refer to 3.02 Hardware Sets).
- C. Provide all out-swinging doors with non-removable pins or security studs as called for in 3.02 Hardware Sets. Furnish three (3) hinges up to 90 inches high and one (1) additional hinge for every 30 inches or fraction thereof.
- D. Furnish three (3) hinges up to 90 inches high and one (1) additional hinge for every 30 inches or fraction thereof.
- E. Provide size 4½" x 4½" for all 1¾" thick doors up to and including 36 inches wide. Doors over 1¾" through 2¼" thick, use 5" x 5" hinges. Doors over 36 inches use 5" x 4½" unless otherwise noted in 3.02 Hardware Sets.
- F. Were required to clear the trim and/or to permit the doors to swing 180 degrees furnish hinges of sufficient throw.
- G. Provide heavy weight hinges on all doors over 36 inches in width.
- H. At labeled door's steel or stainless steel, bearing-type hinges shall be provided. For all doors equipped with closers provide bearing-type hinges.

2.04 LOCK AND LOCK TRIM

- A. All of the locksets, latch sets, and trim to be of one manufacturer as hereafter listed for continuity of design and consideration of warranty. Locksets specified are Schlage "ND" series with the Rhodes lever as specified.

- B. Provide metal wrought box strike boxes and curved lip strikes with proper lip length to protect trim of the frame, but not to project more than 1/8 inch beyond frame trim or the inactive leaf of a pair of doors.
- C. Mechanical Locks shall meet ANSI Operational Grade 1, Series 4000 as specified.
 - 1. Hand of lock is to be field reversible or non-handed.
 - 2. All lever trim is to be through-bolted through the door.
 - 3. Provide all pairs of doors with a 3/4" latch bolt throw.

2.05 CYLINDERS AND KEYING

- A. Provide all exterior and interior locks or Exit Devices requiring cylinders keyed to the New Large Format Interchangeable Core Master Key System and which also complies with performance requirements of ANSI A156.5. All keys shall be of nickel silver material only. The hardware supplier shall meet with the General Contractor, the Architect and the Building Owner Representative at the project jobsite to determine all permanent keying requirements.
- B. Cylinders shall be factory keyed and factory maintained as directed by the Building Owner Representative and the Architect. Provide three- (3) keys per cylinder and six- (6) master keys per master used.
- C. Factory stamp all keys "Do not duplicate" and with key symbol as directed by the Building Owner Representative. Visual key control shall be provided on all permanent keys and cylinders.
- D. Furnish all locks, cylinders and Exit devices with temporary keyed construction cores for the duration of construction. Provide ten (10) construction keys and two (2) construction control keys total. The general contractor shall within thirty (30) days of the installation of permanent cores return all construction cores to the hardware supplier for full credit.

2.06 EXIT DEVICES

- A. All exit devices and trim, including electrified items, to be of one manufacturer as hereafter listed and in the hardware sets for continuity of design and consideration of warranty; electrified devices and trim to be the same series and design as mechanical devices and trim.
- B. Exit Devices to be "UL" listed for life safety. All exit devices for labeled doors shall have "UL" label for "Fire Exit Hardware". All devices mounted on labeled wood doors are to be through-bolted or per the manufacturer's listing requirements. All devices shall conform to NFPA 80 and NFPA 101 requirements.
- C. All exit devices to be of a heavy duty, chassis mounted design, with a one-piece removable covers, eliminating necessity of removing the device from the door for standard maintenance and keying requirements.
- D. All trims to be through-bolted to the lock stile case. Lever design to be the same as specified with the lock sets.

- E. Exit Devices shall be the modern push rail design. All exit devices shall be mounted with sex bolts.
- F. All devices shall carry a three- (3) year warranty against manufacturing defects and workmanship. Exit devices shall be certified by an independent testing lab for a minimum of 1,000,000 cycles.
- G. Furnish roller strikes for all rim and surface vertical rod exit devices. Internal springs shall be coil compression type. Furnish security dead latching for all active latch bolts. Latch bolts to have self lubricating coating to reduce friction and wear. Plated latch bolts not accepted.
- H. All Exit Devices shall be field modifiable as incorporate an Electric Latch Retraction Feature without the purchase of new Panic Exit Hardware.
- J. Exit Devices shall be the Von Duprin "99" series as specified, unless prior written approval is granted in compliance with the General Conditions of the project.

2.07 SURFACE MOUNTED DOOR CLOSERS

- A. All closers for this project shall be the products of a single manufacturer for continuity of design and consideration of warranty. All door closers shall be mounted as to achieve the maximum degree of opening (trim permitting).
- A. All closers to be heavy duty, surface-mounted, fully hydraulic, rack and pinion action with high strength cast iron cylinder to provide control throughout the entire door opening cycle.
- C. Size all closers in accordance with the manufacturer's recommendations at the factory.
- D. All closers to have adjustable spring power sizes 1 or 2 through 4 or 6 and separate tamper resistant, brass, non-critical regulating screw valves for closing speed, latching speed and back-check control as a standard feature unless specified other wise.
- E. All closer covers to be rectangular, full cover type of non-ferrous, non-corrosive material painted to match closer. Provide closer covers only if provided as a standard part of the door closer package.
- F. Closers shall have heavy-duty arms. All closer arms shall be of sufficient length to accommodate the reveal depth and to insure proper installation. The hardware supplier shall provide any and all required brackets, spacers or filler plates as required by the manufacture for a proper and functional installation as part of their base bid.
- G. Supply appropriate arm assembly for each closer so that closer body and arm are mounted on non-public side of door opening and on the interior side of exterior openings, except where required otherwise in the hardware sets.
 - 1. All parallel arm mounted closers to be factory indexed to insure proper installation.

2. Furnish heavy-duty cold forged parallel arms for all parallel arm mounted closers.
- H. Provide closers with special application and heavy-duty arms as specified in the hardware sets or as otherwise called for to insure a proper operating, long lasting opening. Drop plates and any additional mounting brackets required for the proper installation of the door closer shall be included in the hardware supplier's base bid.
- I. Finish: Baked on Powder Coated finish shall match other hardware.
- J. Provide and mount all door closers with sex bolts as provided by the manufacturer.
- K. Closers shall be LCN 4040XP and 1461 FC series as specified unless prior written approval is granted in compliance with the General Conditions of the project.

2.08 DOOR STOPS AND HOLDERS

- A. Door stops are to be furnished for every door leaf. Every door is to have a floor, wall, or an overhead stop.
- B. Place doorstops in such a position that they permit maximum door swing, but do not present a hazard of obstruction. Furnish floor strikes for floor holders of proper height to engage holders of doors.
- C. Where overhead stops and holders are specified, or otherwise required for proper door operation, they are to be heavy duty and of extruded brass, bronze or stainless steel with no plastic parts as specified. The General Contractor shall provide wood blocking in all stud walls specified and scheduled to receive wall stops.
- D. Finish: Shall match other hardware where available.
- E. Acceptable Products
 1. Floor and wall stops as listed in hardware sets. Equivalent products as manufactured by Ives, ABH, Glynn Johnson and Trimco are acceptable.

2.09 PUSH PLATES, DOOR PULLS, AND KICKPLATES

- A. All push plates, door pull, kick plates and other miscellaneous hardware as listed in hardware sets. Equivalent products as manufactured by Ives, Hager and Trimco are acceptable.
- B. Kick plates to be 10 inches high and Mop plates to be 6 inches high, both by 2 inches or 1 inch less than door width (LDW) as specified. They are to be of 16 gauge thick base metal. For door with louvers or narrow bottom rails, kick plate height to be 1 inch less dimension shown from the bottom of the door to the bottom of the louver or glass.
- C. Where required armor plates, edge guards and other protective hardware shall be supplied in sizes as scheduled in the hardware sets.

- D. Finish: Same as other hardware where available.

2.10 FLUSH BOLTS AND COORDINATORS

- A. Provide Flush bolts with Dust Proof Strikes as indicated in the individual hardware sets by Ives, Hager and Trimco are acceptable. Finish shall match the adjacent hardware.

2.11 THRESHOLDS AND SEALS

- A. Provide materials and finishes as listed in hardware sets. National Guard Products has been specified to set a high level of quality, equivalent product by manufactured by Zero, and Pemko shall be acceptable. All thresholds must be in accordance with the requirements of the ADA and ANSI A117.1.
- B. Provide thresholds with wood screws and plastic anchors. Supply all necessary anchoring devices for weather strip and sound seal.
- C. Seals shall comply with requirements of U.B.C. 7-2-97 and UL10C. All thresholds, door bottoms and weather strip inserts shall be a silicone based product as specified in 3.02 Hardware Sets. Other materials used shall be rejected, unless originally specified.
- D. Seals shall comply with the requirements of the Wood Door Manufacturer's certification requirements.
- E. All thresholds shall be provided with none slip coating (SIA) as specified in the hardware sets.

2.12 FINISHES

- A. Finishes for all hardware are as required in this specification and the hardware sets.
- B. Special care is to be taken to make uniform the finish of all various manufactured items.

2.13 DOOR SILENCERS

- A. Provide door silencers at all openings without gasket. Provide two- (2) each at pair of doors and three- (3) or four- (4) each for each single door (coordinate with the frame manufacturer).

2.14 PROPRIETARY PRODUCTS

- A. References to specific products are used to establish quality standards of utility and performance. Unless otherwise approved provide only the specified product.
- B. All other materials, not specifically described, but required for a complete and proper finish hardware installation, are to be selected by the Contractor, subject to the approval of the Architect and the Building Owner Representative.

- B. Architect and the Building Owner Representative reserve the right to approve all the substitutions proposed for this specification. All requests for substitution to be made prior to bid in accordance with Division 1, General Requirements, and are to be in writing, hand delivered to the Architect. Two (2) copies of the manufacturer's brochures and a physical sample of each item in the appropriate design and finish shall accompany requests for substitution.

PART 3 - EXECUTION

3.01 INSTALLATION AND SERVICE ITEMS OF FINISH HARDWARE

- A. All finish hardware shall be installed by an experienced finish hardware installer with at least ten (10) years experience after a pre-installation meeting between the contractor, hardware Manufacturers representative, the hardware supplier, the hollow metal supplier and the wood door supplier. The finish hardware installer shall be responsible for the proper installation and function of all doors and hardware.
- B. The hardware supplier's office and/or warehouse shall be located within a one hundred twenty five (125) mile radius of the project site as to better service the general contractor and the Building Owner Representative during the course of this project.
- C. Check hardware against the reviewed hardware schedule upon delivery. Store the hardware in a dry and secure location to protect against loss and damage.
- D. Install finish hardware in accordance with approved hardware schedule and manufacturers' printed instructions. Pre-fit hardware before finish is applied to door; remove and reinstall after finish is complete and dry. Install and adjust hardware so that parts operate smoothly, close tightly, and do not rattle.
- E. Mortise and cutting to be done neatly, and evidence of cutting to be concealed in the finished work. Protect all Finish hardware from scratching or other damage.
- F. The hardware supplier, general contractor and hardware installer shall after three (3) months of the Building Owner acceptance of the facility perform an on site survey of the finish hardware. Any item of finish hardware found to be defective or out of adjustment shall be replaced or adjusted for the proper function and operation of the door assembly at the contractor's, supplier's and/or installer's expense. The hardware supplier shall provide a written report of any and all affected items to the Architect and the Building Owner (No Exceptions). The scheduled inspection date for the on site inspection and adjustment of finish hardware shall be provided to the Architect as a part of the general contractor and hardware supplies close-out documentation for this project.

3.02 HARDWARE SETS

SPEXTRA: 87377

HARDWARE SET # 01

DOORS #

1/112

EACH TO HAVE:

Linn _ San Manuel
Emergency Service Facility Precinct No. 4
San Carlos Texas

Project #201.310

2	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
2	EA	PANIC HARDWARE	9949-L-996-06-SNB	628	VON
2	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
2	EA	FSIC CORE	23-030-ICX VKC	622	SCH
2	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
2	EA	PA MOUNTING PLATE	4040-18PA	689	LCN
2	EA	CUSH SHOE SUPPORT	4040-30	689	LCN
2	EA	BLADE STOP SPACER	4040-61	689	LCN
2	EA	DOOR BOTTOM	1015AV-DOOR WIDTH	AL	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP
			WEATHERSTRIP BY DOOR/FRAME		
			MANUFACTURER		

HARDWARE SET # 02 (ACCESS CONTROLLED)

DOORS

2/100 3/102

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	EA	PANIC HARDWARE	99-L-996-06-SNB	628	VON
1	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	4040XP EDA TBSRT	689	LCN
1	EA	PA MOUNTING PLATE	4040-18PA	689	LCN
1	EA	ELECTRIC STRIKE	6111 FSE EB 24VDC	630	VON
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	DOOR BOTTOM	1015AV-DOOR WIDTH	AL	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP
			WEATHERSTRIP BY DOOR/FRAME		
			MANUFACTURER		

CARD READER AND POWER SUPPLY PROVIDED BY SECURITY CONTRACTOR.

HARDWARE SET # 03

DOORS

7/118 8/118

EACH TO HAVE:

ALL HARDWARE

PROVIDED BY THE OVERHEAD DOOR
MFG.

HARDWARE SET # 04

DOORS

6/124

EACH TO HAVE:

1	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH

BALANCE HARDWARE PROVIDED BY THE WIRE MESH DOOR
MFG.

HARDWARE SET # 05

DOORS #

4/111

EACH TO HAVE:

2	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	PANIC HARDWARE	9949-L-996-06-SNB	628	VON
1	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	COORDINATOR	3092	689	TRI
2	EA	SURFACE CLOSER	4040XP HEDA TBSRT	689	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	DRIP CAP	16A-FRAME HEADER PLUS 4"	628	NGP
1	EA	HEAD SEAL	700S-LENGTH REQUIRED	AL	NGP
2	SET	JAMB SEAL	162S-LENGTH REQUIRED	628	NGP
1	SET	ASTRAGAL	9605A-DOOR HEIGHT	628	NGP
2	EA	DOOR BOTTOM	1015AV-DOOR WIDTH	AL	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALL DOORS WITH A MAXIMUM GAP OF 1/4" BETWEEN THE DOORS LEAFS.
INSTALLATION OF HEAD SEAL MUST BE DONE BEFORE THE INSTALLATION OF THE
SURFACE MOUNTED DOOR CLOSERS AND COORDINATOR.

HARDWARE SET # 06

DOORS #

5/118

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	EA	PANIC HARDWARE	99-L-996-06-SNB	628	VON
1	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	DRIP CAP	16A-FRAME HEADER PLUS 4"	628	NGP
1	EA	HEAD SEAL	700S-LENGTH REQUIRED	AL	NGP
2	SET	JAMB SEAL	162S-LENGTH REQUIRED	628	NGP
1	EA	DOOR BOTTOM	1015AV-DOOR WIDTH	AL	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALLATION OF HEAD SEAL MUST BE DONE BEFORE THE INSTALLATION OF THE
SURFACE MOUNTED DOOR CLOSER.

HARDWARE SET # 07

Linn _ San Manuel
Emergency Service Facility Precinct No. 4
San Carlos Texas

Project #201.310

DOORS

12/107	12/109	12/116	12/117

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	INDICATOR DEADBOLT	B571 X (6) 61-510	626	SCH
1	EA	SURFACE CLOSER	1461 FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	DOOR STOP	FS17 OR WS407CCV AS REQUIRED	626	IVE
1	EA	COAT AND HAT HOOK	582	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE SET # 08

DOORS

10/104	10/110	10/115

EACH TO HAVE:

2	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	SET	AUTO FLUSH BOLT	FB41P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO 14-042	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	COORDINATOR	3092	689	TRI
2	EA	SURFACE CLOSER	1461 HDPA FC TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP
1	SET	ASTRAGAL	9605A-DOOR HEIGHT	628	NGP

INSTALL DOORS WITH A MAXIMUM GAP OF 1/4" BETWEEN THE DOORS LEAFS.
180 DEGREE DOOR SWING REQUIRED.

HARDWARE SET # 09

DOORS

9/101	9/103	9/105

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	ND53TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	1461 FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP

HARDWARE SET # 10A (ACCESS CONTROLLED)

DOORS

Linn _ San Manuel
Emergency Service Facility Precinct No. 4
San Carlos Texas

11/106A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	ELECTRIC STRIKE	6211 FSE EB 24VDC	630	VON
1	EA	SURFACE CLOSER	1461 FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP

CARD READER AND POWER SUPPLY PROVIDED BY SECURITY CONTRACTOR.

HARDWARE SET # 10B

DOORS

11/106B

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	SURFACE CLOSER	1461 FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP

HARDWARE SET # 11

DOORS

13/108

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	1461 FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP

HARDWARE SET # 12

DOORS

15/114

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-996-06-SNB	628	VON
1	EA	CYLINDER	20-059/20-079 AS REQUIRED	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	1461 HDPA FC TBSRT	689	LCN

Linn _ San Manuel

Emergency Service Facility Precinct No. 4

San Carlos Texas

Project #201.310

1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP
1	EA	HEAD SEAL	700S-LENGTH REQUIRED	AL	NGP
2	SET	JAMB SEAL	162S-LENGTH REQUIRED	628	NGP
1	EA	DOOR SWEEP	200SA-DOOR WIDTH	628	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALLATION OF HEAD SEAL MUST BE DONE BEFORE THE INSTALLATION OF THE SURFACE MOUNTED DOOR CLOSER.
180 DEGREE SWING IS REQUIRED.

HARDWARE SET # 13

DOORS

16/120

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	1461 SCUSH FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP
1	EA	DOOR SWEEP	200SA-DOOR WIDTH	628	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALL DOOR SWEEP ON THE PULL SIDE OF THE DOOR OPENING.

HARDWARE SET # 14

DOORS

17/119

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	ENTRANCE LOCK	ND53TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	SURFACE CLOSER	1461 HDPA FC TBSRT	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B4E	630	IVE
1	EA	DOOR STOP	FS17 OR WS407CCV AS REQUIRED	626	IVE
1	SET	SEAL	2525B-HEAD & JAMBS	BRN	NGP
1	EA	HEAD SEAL	700S-LENGTH REQUIRED	AL	NGP
2	SET	JAMB SEAL	162S-LENGTH REQUIRED	628	NGP
1	EA	DOOR SWEEP	200SA-DOOR WIDTH	628	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALL DOOR SWEEP ON THE PULL SIDE OF THE DOOR OPENING.
INSTALLATION OF HEAD SEAL MUST BE DONE BEFORE THE INSTALLATION OF THE SURFACE MOUNTED DOOR CLOSER.
180 DEGREE SWING IS REQUIRED.

HARDWARE SET # 15

DOORS

14/113

EACH TO HAVE:

1	EA	SURFACE TRACK	AS REQUIRED		HEN
4	EA	HANGER	AS REQUIRED		HEN
2	EA	FLUSH PULL	1111A	630	TRI
4	EA	STOPS	AS REQUIRED		HEN
4	EA	CARRIERS	AS REQUIRED		HEN

PROVIDE HENDERSON BARN DOOR TRACK SYSTEM RATED FOR DOOR WEIGHT.
INSTALL FLUSH PULLS ON LIVING ROOM SIDE OF DOOR.

HARDWARE SET # 16

DOORS

18/125

EACH TO HAVE:

1	EA	CONTINUOUS HINGE	112HD-DOOR HEIGHT	628	IVE
1	EA	STOREROOM LOCK	ND80TD RHO	626	SCH
1	EA	FSIC CORE	23-030-ICX VKC	622	SCH
1	EA	LOCK GUARD	LG12	630	IVE
1	EA	OH STOP & HOLDER	450F	630	GLY
1	EA	DRIP CAP	16A-FRAME HEADER PLUS 4"	628	NGP
1	EA	HEAD SEAL	700S-LENGTH REQUIRED	AL	NGP
2	SET	JAMB SEAL	162S-LENGTH REQUIRED	628	NGP
1	EA	DOOR BOTTOM	1015AV-DOOR WIDTH	AL	NGP
1	EA	THRESHOLD	896S SIA-FRAME WIDTH		NGP

INSTALLATION OF HEAD SEAL MUST BE DONE BEFORE THE INSTALLATION OF THE
SURFACE MOUNTED OVERHEAD STOP & HOLDER.

END OF SECTION

SECTION 08730

DOOR AND MISCELLANEOUS ACCESSORIES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Work Included: Provide all weather-stripping, seal and thresholds required for a complete and operable facility and as required to meet current handicapped and safety regulations.
- B. Related Work Described Elsewhere:
 - 1. Installation on hollow metal doors Section 08100
 - 2. Installation on wood doors Section 08210

1.02 QUALITY ASSURANCE

- A. Installation: Use only personnel who are skilled in the work required.
- B. Exit Openings: Regardless of typically types specified or detailed, provide only thresholds, stripping and seal units which do not interfere with or proper operation of doors at fire-rated openings and at emergency exit openings.

1.03 SUBMITTALS

- A. Door Accessory Sets:
 - 1. The submittals, and shall be in the form of "Door Accessory Sets" assigned to each of the various doors that are scheduled on the Door Schedule.
 - 2. Make submittals and resubmits if necessary, in accordance with provisions of Section 01340 of these Specifications.
- B. Manufacturer's Recommendations: Prior to Installation, deliver to installing personnel from manufacturer regarding installation methods.

1.04 PRODUCT HANDLING

- A. Packaging:
 - 1. Furnish door accessories with each unit clearly marked or numbered in accordance with door Schedule.
 - 2. Pack each item complete with all necessary pieces and fasteners.

PART 2 PRODUCTS

2.01 MANUFACTURES

- A. Model numbers include for weather-stripping and sound seals are items manufactured by Zero Weather Stripping Co., Inc., unless otherwise noted, and are listed as a standard quality.
- B. Equivalent items of the following manufacturers are acceptable:
 - 1. Penko Mfg. Co.
 - 2. Reese Enterprise, Inc.
 - 3. National Guard Products, Inc.
 - 4. A.J. Nay, Inc.

2.02 ACCESSORIES

- A. Exterior Hollow Metal Door Thresholds:
 - 1. Head and Jambs: Zero 1-19W, 34 B-S gauge bronze.
 - 2. Sill: Zero #37-J, 31 B—gauge bronze.
- B. Sound Seals:
 - 1. Threshold: Zero-663.
 - 2. Sill: Zero #315.
 - 3. Head and Jamb: Zero #3000.

2.03 OTHER MATERIALS

- A. Materials, not specifically describe but required for a complete and proper installation of finish hardware, shall be new, first quality of their respective kinds, and subjected to approval of Architect.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set units plumb and level, accurately centered at optimum location for maintaining a permanent seal.
- B. Adjust doors, frames and hardware, if necessary, to achieve proper operations of seals and stripping.
- C. Install thresholds with machines screw anchors and lead-shield at locations pre-drilled and evenly spaced in thresholds units.
- D. At exterior doors, set thresholds in a bed of sealant. Do not plug drainage holes or weeps.
- E. Install interior floor edge strip at finish floor material changes, where indicated on the drawings, and at doorways as required for finish surfaces.

END OF SECTION

Door & Hardware Set Index

Door #	Hardware Set #
18/125	16
1/112	01
10/104	08
10/110	08
10/115	08
11/106	10
12/107	07
12/109	07
12/116	07
12/117	07
13/108	11
14/113	15
15/114	12
16/120	13
17/119	14
2/100	02
3/102	02
4/111	05
5/118	06
6/124	04
7/118	03
8/118	03
9/101	09
9/103	09
9/105	09

Project: Emergency Services Facility Precinct No. 4	Control #87377	Print Date: Dec 11 2013 11:39AM EST	
Supplier:	Version #1	Version Date: Dec 11 2013 8:33AM EST	Page 1 of 1

SECTION 09250
GYSUM WALLBOARD SYSTEMS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Wood frame, metal wall and ceiling framing for gypsum board construction
- B. Exterior Sheathing
- C. Gypsum Board
- D. Moisture Resistant Gypsum Board
- E. Glass-Mat Gypsum Board
- F. Abuse Gypsum Panels
- G. Impact Resistant Gypsum Panels
- H. Cement Tile Backer Board
- I. Moisture Resistant Tile Backer Board
- J. Taped, filled and sanded joint treatment

1.2 RELATED WORK

- A. Section 06100 – Rough Carpentry
- B. Section 07160 – Dampproofing Above Grade
- C. Section 07210 – Building Insulation
- D. Section 07270 – Firestopping and Fire Safing
- E. Section 07900 – Building Sealants
- F. Section 09310 – Ceramic Tile
- G. Section 09900 – Painting and Staining

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.

- B. Certification: Manufacturer's affidavit that materials used contains no asbestos.

1.4 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements

1.5 REFERENCES

- A. ASTM International (ASTM)
 - 1. C1396/C1396M, Standard Specification for Gypsum Wallboard
 - 2. C645-08, Standard Specification for Nonstructural Steel Framing Members
 - 3. C754-07, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
 - 4. C840, Standard Specification for Application and Finishing of Gypsum Board
 - 5. C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84mm) to 0.112 in. (2.84 mm) in Thickness
 - 6. C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
 - 7. C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
 - 8. C1177, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
 - 9. C1280, Standard Specification for Application of Gypsum Sheathing
 - 10. D3273, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- B. Gypsum Association (GA)
 - 1. 216, "Recommended Specification for the Application and Finishing of Gypsum Board"
- C. Federal Specifications (FS)
 - 1. SS-L-30

1.6 WARRANTY

- A. Warrant the work specified for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.
- B. In addition, provide warranty from the manufacturer for the following products:
 - 1. Exterior sheathing weathering warranty covering in-place exposure damage to exterior sheathing for twelve (12) months.
 - 2. Exterior sheathing warranty against manufacturing defects for five (5) years.
 - 3. Abuse Resistant Panel weathering warranty covering in-place exposure damage to sheathing for six (6) months.
 - 4. Abuse Resistant Panel warranty against manufacturing defects for five (5) years.
 - 5. Glass-mat sheathing weathering warranty covering in-place exposure damage to sheathing for three (3) months.
 - 6. Glass-mat sheathing warranty against manufacturing defects for three (3) years.
 - 7. Tile backer board warranty against manufacturing defects for 20 years.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Where products are named in the specifications, they are considered basis of specification. 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. Gypsum Wallboard and related products and materials:
 - a. CertainTeed
 - b. G-P Gypsum Corporation (Georgia Pacific)
 - c. James Hardie Building Products, Inc.
 - d. National Gypsum Company (Gold Bond)
 - e. Temple-Inland
 - f. United States Gypsum Company (USG)
 - g. Dietrich Metal Framing

2.2 MATERIALS

- A. Drywall Suspension System (If shown or required): Pre-engineered drywall suspension system specially created to simplify the design and construction of flat drywall ceilings. Approved Product/Manufacturer: USG Drywall Suspension System manufactured by USG Interiors, Inc., or Architect approved equal.
- C. Wall and Ceiling Materials:
 - 1. Exterior Sheathing: ASTM C1177; 1/2 inch thick water resistant treated gypsum core, glass mats both front and back faced or embedded in core, weather resistant surface, zero flame spread, zero smoke developed. Approved Product/Manufacturer: “Dens-Glass Gold Exterior Guard” manufactured by Georgia-Pacific; “GlasRoc” manufactured by CertainTeed; “Securock” manufactured by USG. Use as exterior sheathing in metal stud framed construction behind face brick in cavity wall construction, and behind plaster.
 - 2. Gypsum Wallboard:
 - a. Wallboard: 5/8 inch thick, tapered-edged, conforming to ASTM C1396, Type X. Sizes shall be 4 feet-0 inches wide by longest practical length to minimize joints.
 - b. Moisture Resistant: 5/8 inch thick, moisture resistant (MR), green faced, tapered-edged, conforming to ASTM C1396. Sizes shall be 4 feet-0 inches wide by longest practical length to minimize joints. Provide fire rated core where required to maintain fire rating of adjacent assembly.
 - 3. Glass-Mat Gypsum Board: 5/8 inch thick, longest practical length, with long edges tapered. ASTM C1177, coated inorganic glass mat-faced, water-resistant treated gypsum core wallboard. Conforming to the physical properties of ASTM C1396 and ASTM C1177. Rating of ten (10) “No Mold Growth” as tested for four (4) weeks according to ASTM D3273. Approved Product/Manufacturer: “DensArmor Interior Guard Plus” manufactured by G-P Gypsum Corp., or Architect approved equal.
 - 4. Abuse Resistant Gypsum Panel (Moderate Duty): 5/8 inch thick, Type X, with tapered edge, “DensArmor Plus Abuse Guard” manufactured by G-P Gypsum Corp., “Fiberock AR” manufactured by USG Corporation, “Hi-Abuse XP Wallboard” manufactured by National Gypsum Company, or approved equal. Use where abuse resistant gypsum wallboard is shown or scheduled.

5. Impact Resistant Gypsum Panel (Heavy Duty): 5/8 inch thick, Type X, with tapered edge, "DensArmor Plus Impact Resistant Panel" manufactured by G-P Gypsum Corp., "Fiberrock VHI" manufactured by USG Corporation, "Hi-Impact XP Wallboard" manufactured by National Gypsum Company, or approved equal. Use in stud framed stair enclosures.
6. Gypsum Shaft Liner: One (1) thick gypsum core for added fire resistance and multi-layered green paper facings that are treated to resist moisture penetration.
7. Tile Backer Board (Wet areas): 1/2 inch thick, "G-P Dens-Shield Tile Guard", Bonsal "Util-A-Crete", "USG Durock", "Wonderboard", "National Gypsum Permabase", or Architect approved equal. Use as sheathing at shower areas and restrooms, or as scheduled on walls to receive ceramic tile in other wet areas. Use greatest width by longest practical length to minimize joints. Use joint reinforcement and fasteners in accordance with manufacturer's printed instructions. For fiber and cement backer boards, provide waterproof membrane behind backer board per TCA W244. Coated glass-mat water-resistant gypsum board does not require waterproofing membrane per TCA W245.
8. Tile Backer Moisture Resistant Board (Dry areas): 1/2 inch thick, "Fiberrock Brand 'Aqua-Tough' Gypsum Interior Panels" as manufactured by USG Corporation; "DensArmor Interior Guard Plus" manufactured by G_P Gypsum Corp, or Architect approved equal.
9. Channels: 16 gauge cold formed steel channels with hot dip galvanized finish. Size as indicated on drawings. Use for suspended ceilings and elsewhere as indicated.
10. Furring Channels: Standard 2-3/4 inches wide, 7/8 inch deep galvanized sheet metal furring channel.
11. Corner Beads: No. 28 gauge galvanized steel, 1-1/4 inch legs. Use at all exterior corners.
12. Joint Compound: Standard types manufactured by gypsum wallboard manufacturer for intended use. Fire rated type must be used on fireproof systems. Perlite and other additives not permitted.
13. Laminating Adhesives: Standard type manufactured or recommended by manufacturer of product to be laminated.
14. Acoustic Sealant: Single component, non-skinning, non-hardening synthetic rubber for use in the acoustical sealing of gypsum board partitions. STC rating as required by drawings in accordance with manufacturers instructions to achieve rating. Approved Products and Manufacturers: Tremco Acoustical Sealant manufactured by Tremco Sealant/Weatherproofing Division, Beachwood, OH; (800) 321-7906, or Architect approved equal.
15. Ceiling Hanger and Tie Wire: 0-gauge galvanized hanger wire and 16 gauge tie wire.
16. Screws: One (1) inch and 1-5/8 inch long self drilling, self tapping cadmium plated bugle head type. Comply with applicable reference standards.
17. Resilient Clips: Standard type for resilient installation in accordance with wallboard manufacturer's recommendations.
18. Control Joints: Metal (USG #093/Dietrich 093 Control Joint) type with 1/4 inch open joint, perforated flanges for floating in place.
19. Wall Fixture Reinforcement: 6 inches, 14 gauge cold formed steel galvanized channels.
20. Glass-fiber Mesh Tape: minimum 2 inch wide self-adhering glass-fiber type, 10X10 threads per inch.
21. Silicone Joint Sealant: ASTM C920, Type S, grade NS, compatible with exterior sheathing tape and sheathing, instructed by tape and sheathing manufacturers for use with glass-fiber mesh sheathing tape and for covering exposed fasteners.

- 22. Waterproof membrane under cementitious/fiber tile backer board shall be minimum 15-pound building felt or 4-mil polyethylene film in accordance with ANSI A2.1.8.
- 23. Where indicated on drawings, Fry Reglet "F" Reveal, as manufactured by Fry Reglet Corporation Model Number FDM-625-75, shall be installed. Aluminum shall be extruded alloy 6063T5, with chemical conversion coating, clear anodized or other specified finish. Refer to finish section. All corners shall be mitered for a seamless appearance at all changes in direction.

PART 3 – EXECUTION

3.1 EXTERIOR SHEATHING INSTALLATION

- A. Furnish exterior sheathing where indicated on drawings and install sheathing in accordance with manufacturer's instructions and applicable instructions in GA-253 and ASTM C1280, without openings, gaps, cracks, or holes.
- B. Attach sheathing to metal framing with gold side out and with screws spaced eight (8) inches on center at perimeter where there are framing supports and eight (8) inches on center along intermediate framing in field.
- B. Use maximum lengths possible to minimize number of joints.
- C. Drive fasteners to bear tight against and flush with surface of sheathing. Do not countersink.
- D. Locate fasteners minimum 3/8 inch from edges and ends of sheathing panels.
- E. Apply continuous dampproofing as specified in Section 07160, Dampproofing Above Grade. Prep exterior sheathing per manufacturer's instructions.

3.2 INTERIOR METAL FRAMING INSTALLATION

- A. Steel Framing Installation Standard: Comply with ASTM C754
- B. Floor Track: Attach to floor at 24 inches maximum centers with shoot-in pins or concrete nails.
- C. Ceiling Track: Fasten at 24 inch intervals, staggered. Where shown or required to extend above ceiling, brace to the structure at intervals not exceeding 4 feet-0 inches.
- D. Deflection Track (DT): Deflection track shall allow 1/2 inch movement. Do not fasten studs directly to Deflection Track. At fire rated walls, Contractor's shall use the specified deflection track with firestop systems.
- E. Drywall Suspension System: Use at gypsum drywall suspended ceilings, where shown or required.
- F. Metal Studs:
 - 1. Single lengths positioned vertically straight and plumb in the runners, spaced 16 inches on center, unless shown otherwise on drawings.

2. Anchor all studs located adjacent to door and window frames, partitions intersections and corners to runner flanges by positive screw engagement through each stud flange and runner flange.
 3. Position all studs vertically with the open side facing in the same direction, engaging the floor and ceiling runners.
 4. Use positive screw attachments with 3/8 inch or 1/2 inch Type "S" or "S-12" pan head screws through each stud flange and runner flange.
- F. Wall Fixture Reinforcement: Provide solid bridging spanning between wall studs at all wall mounted fixtures, finish hardware, toilet partitions, accessories and equipment.

3.3 WALLBOARD INSTALLATION

- A. Apply all ceiling boards first as described below. Cut boards so that they slip easily into place. Butt all joints loosely. Never force panels into position. Place tapered or wrapped edges next to one another.
- B. Select the maximum practical length to minimize end joints. All end joints shall be neatly fitted and staggered. Joints on opposite sides of partition shall be so arranged as to occur on different studs.
- C. Never place a butt end or a cut edge next to a tapered or rounded edge. Whenever possible, apply boards perpendicular to framing and in lengths that will span ceilings and walls without creating end (butt) joints. If butt joints do occur, stagger and locate them as far from the center of walls and ceilings as possible.
- D. Support all ends and edges of gypsum board on framing, except long edges at right angles to framing and where end joints are to be floated between frame members and back-blocked.
- E. When fastening, apply hand pressure on panel next to fastener being driven to insure panel is in tight contact with framing member.
- F. Install metal corner bead at external corners. Where length of the corner does not exceed standard stock lengths, use a single length.
- G. Install gypsum board 1/2 inch above surface of slab to prevent wicking of moisture.
- H. Install metal trim where indicated.
- I. To insure level surfaces at joints, arrange board application so that the leading edge of each board is attached to the open or unsupported edge of a steel stud flange. To do this, all studs must be placed so that their flanges point in the same direction. Board application is then planned to advance in the direction opposite to flange direction.
- J. The leading edge of gypsum board shall not be attached to the web edge of a flange.
- K. Fasten wallboard at 12 inches on center except at the edges/joints which shall be at 8 inches on center
- L. Edge-Grip Clips: Position clips on the back of the panels and drive prongs into panel edges. Space clips 16 inches on center Screw-attach slip to framing, furring or wall surface.

- M. Finishing:
 - 1. Apply at least two (2) coats of joint compound over beads, screw heads and trim, and each coat shall be feathered out onto panel faces.
 - 2. Float out and sand joints to make joints invisible when painted with non-texture paint.
- N. Caulk around pipes, ducts, structure or similar items which penetrate drywall systems.
- O. Provide acoustical sealant at walls in accordance with manufacturer's instructions.
- P. Control joints shall be located 30 feet-0 inches on center maximum and along building expansion joints, unless noted otherwise on drawings. Locations shall be reviewed with Architect prior to final placements.

3.4 TILE BACKER BOARD INSTALLATION – WET AREAS

- A. Install tile backer on walls vertically or horizontally.
- B. Coated Glass Mat Backer Boards: Install tile backer directly on metal stud framing system in showers and other wet areas in accordance with manufacturer's recommendations and TCA, Methods W245 at walls and B420 for shower installations.
- C. Cementitious/Fiber Backer Boards: Install tile backer on approved waterproof membrane in showers and other wet areas in accordance with manufacturer's recommendations and TCA, Methods W245 at walls and B420 for shower installations.
- D. Finishing:
 - 1. Substrate for tile: Apply clear silicone sealant to corners and board joints. Apply glass mesh joint tape over joints. Embed tape in setting material specified for tile finishes. Seal penetrations with setting material or silicone sealant. Allow joints and penetrations to dry prior to installing tile systems.

3.5 TILE BACKER BOARD INSTALLATION – DRY AREAS

- A. Install tile backer on walls vertically or horizontally.
- B. Install tile backer on walls in accordance with manufacturer's recommendations and TCA, Method W245.
- C. Finishing:
 - 1. Substrate for tile: Apply glass mesh joint tape over joints. Embed tape in setting material specified for tile finishes. Allow joints to dry prior to installing tile systems.

3.6 GLASS MAT BOARD INSTALLATION

- A. Install glass mat boards on walls vertically or horizontally.
- B. Finishing: (As applicable)
 - 1. Substrate for paint and wall coverings, dry areas (untiled): Apply glass mesh joint tape over joints. Embed tape in setting-type joint compound specified. Apply skim coat of setting-type joint compound over surface of tile backer for smooth finish.

2. Substrate for high-humidity finish systems (untiled): Apply six (6) inch wide reinforcing fabric over joints. Embed fabric in ground coat. Skim-coat tile backer surface with ground coat for smooth finish. Apply in accordance with finish coat manufacturer's instructions.
3. Substrate for wet area, water reducible epoxy coating finish (untiled): Apply six (6) inch wide reinforcing fabric over joints. Embed fabric in ground coat. Skim-coat with ground coat and compatible primer. Apply epoxy coatings specified as finishing step with epoxy coating system specified.

3.7 ABUSE GYPSUM PANEL

- A. Install in accordance with manufacturer's instructions.
- B. Install at all stairs where gypsum wallboard is shown or scheduled.

3.8 CEILING FRAMING INSTALLATION

- A. Main Runners: 9-gauge hanger wires shall be spaced not over 4 feet-0 inches in the direction of 1-1/2 inch main runner channels and not over 4 feet-0 inches in the direction of right angles to the main runner, and within 6 inches of the ends of main runners and of boundary walls, girders or similar interruptions of ceiling continuity. Do not hang wire supports from metal deck unless directed to do so by Architect or Structural Engineer. Main runners shall be spaced not over 4 feet-0 inches on center.
- B. Cross tees shall be spaced in accordance with manufacturer's recommendations or in conformance with UL Fire Resistance Directory.
- C. Furring Channels: Space 16 inches on center, and saddle-tie with two strands of 16-gauge tie wire to main runners or main support members. Do not let into or come in contact with abutting masonry walls. End splices shall be provided by nesting channels or studs no less than 8 inches and securely wire-tie.
- D. Drywall Suspension System: Install where indicated in accordance with manufacturer's instructions.
- E. Provide control joints in ceiling at maximum 30 feet on center and, if possible, to coincide with expansion joints in the roof above.

3.9 CEILING BOARD INSTALLATION

- A. Apply gypsum board of maximum practical length with the long dimension at right angles to the furring channel and fastened with one (1) inch drywall screws spaced 12 inches on center in the field of the board and along abutting ends.
- B. Align abutting end or edge joints over the web surface of the furring channel. Tie neatly and accurately with end joints staggered.
- C. Install gypsum board ceiling panels in drywall suspension system.

3.10 WORKMANSHIP

- A. Visual: Correct any nicks, bumps, out-of-level or out-of-plumb areas detectable to the naked eye.

- B. Walls: 3/8 inch maximum deviation from vertical.
- C. Bumps in Boards: Maximum 1/8 inch in 24 inches.
- D. Corners: Maximum out-of-square 1/8 inch in 16 inches.
- E. Float solid between corner beads less than 36 inches apart. Surfaces that appear concave are not acceptable.
- F. Provide "J" mold and continuous 1/4 inch reveal wherever gypsum board directly butts other material or when end is exposed.
- G. Float Control Joints flush with wall surface so that ceiling wall mold specified separately will align with wall surface flat and straight.

3.11 COMMENCEMENT RESTRICTIONS

- A. Interior gypsum wallboard and ceiling board installation may not commence until all exterior damp-proofing and roofing are completed and roof top equipment is fully installed and flashed and exterior wall openings are protected.

END OF SECTION

SECTION 09310

CERAMIC TILE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Thin set glazed wall and floor tile, base and necessary trim shapes, mortar and grout, expansion joints, sealants, transition stripes, and accessories shown or required to complete work.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Samples:
 - 1. Selection: Submit full range of colors, patterns, textures and finishes available for selection of tile and threshold.
 - 2. Approval:
 - a. Submit Samples of selected tile mounted on 12 inch x 12 inch board indicating joint size and grout.
- C. Certificates:
 - 1. Provide Master Grade Certificate as specified in ANSI A137.1.
 - 2. Manufacturer's affidavits that materials used contain no asbestos.

1.3 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. Installation Specifications:
 - a. A108.5, Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - b. A108.6, Ceramic Tile installed with Chemical-Resistant, Water-Cleanable Tile-Setting and Grouting Epoxy
 - c. A108.10, Installation of Grout in Tilework
 - 2. Material Specifications:
 - a. A118.4, Latex-Portland Cement Mortar
 - b. A118.6, Ceramic Tile Grouts
 - c. A136.1, Organic Adhesives for Installation of Ceramic Tile
 - d. A137.1, Ceramic Tile
- B. American Society for Testing and Materials (ASTM)
 - 1. C144, Standard Specification for Aggregate for Masonry Mortar
 - 2. C150, Standard Specification for Portland Cement
 - 3. C206, Standard Specification for Finishing Hydrated Lime
- C. Tile Council of America, Inc. (TCA)
 - 1. 2008 Handbook for Ceramic Tile Installation

1.4 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers listed whose product meets or exceeds the specifications may be used on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions in order to be considered.
 - 1. Ceramic Tile:
 - a. Dal-Tile, San Antonio, TX; (210) 342-9351
 - b. American Olean Tile Co., Dallas, TX; (214) 398-1411
 - c. Interceramic, USA, Garland, TX; (800) 496-8453
 - d. U.S. Tile Co., Corona, CA; (800) 252-9548
 - e. United States Ceramic Tile Co., East Sparta, OH; (800) 321-0684
 - 2. Tile Setting and Grout Materials: Those manufactured by the approved tile manufacturers named above or any of the following as approved by the tile manufacturer for use with his tile and to suit application.
 - a. ARDEX L.P., Aliquippa, PA; (724) 203-5000
 - b. Custom Building Products, Seal Beach, CA; (562) 598-8808
 - c. Laticrete International, Inc., Bethany, CT; (800) 243-4788
 - d. Mapei Corporation, Deerfield Beach, FL; (888) 876-2734

2.2 INTERIOR TILES

- A. Ceramic Tile:
 - 1. Unglazed Ceramic Floor Tile:
 - a. Type/Size: Non-glazed 1 inch by 1 inch porcelain mosaic tile, with cushion edge.
 - b. Base: Cove type to match wall tile type and size.
 - c. Colors: As selected by Architect from manufacturer's available colors, but for pricing purposes, Offerors may use 25 percent from the fourth most expensive price group, 25 percent from the third most expensive price group, 25 percent from the second most expensive price group, 25 percent from the least expensive price group.
 - d. Pattern: as selected by Architect from available random blends.
 - 2. Glazed Ceramic Wall Tile:
 - a. Type/Size: Bright or matte glazed 4-1/4 inch by 4-1/4 inch ceramic tile, with cushion edge.
 - b. Shapes: Provide necessary trim shapes to terminate tile with a bull-nose edge and rounded external corners. Provide square internal vertical corners and ceiling – wall joints. Provide built-up cove base at showers as shown or required.
 - c. Colors: As selected by Architect from manufacturer's available colors, but for pricing purposes, Offerors may use 40 percent from Price Group I, 20 percent from Price Group II, 20 percent from Price Group III, 20 percent from Price Group IV.
 - d. Pattern(s): As shown on drawings, but subject to change.
 - 3. Unglazed Ceramic Wall Tile:
 - a. Type/Size: Non-glazed 2 inch by 1 inch porcelain mosaic tile, with cushion edge, brick joint.

- b. Base: Cove type to match wall tile type and size and color.
 - c. Colors: As selected by Architect from all blend colors for unglazed ceramic tiles; Keystone by Daltile to be used as basis of design.
 - d. Pattern: as selected by Architect from available random blends.
- B. Mortar Adhesive and Grout:
 - 1. Portland Cement: ASTM C150, Type 1
 - 2. Lime: ASTM C206, Type "S"
 - 3. Sand: ASTM C144
 - 4. Water: Potable
 - 5. Bond Coat: Dry-set mortar conforming to ANSI A118.4
 - 6. Organic adhesive: Comply with ANSI A136.1. Furnish current Certification of Conformance.
 - 7. Grout (Typical except as wet areas and restroom floors):
 - a. As instructed by tile manufacturer
 - b. Color selected by Architect
- C. Epoxy Grout (At wet areas and restroom floors): Use one (1) of the following 100 percent solids epoxy grout in accordance with ANSI A118.3. No substitutions. Color shall be as selected by Architect from manufacturer's full line of available colors:
 - 1. ARDEX L.P., WA Epoxy Grout, Aliquippa, PA (724) 203-5000
 - 2. Polyblend® Tile Grout with 100 percent Solids Epoxy manufactured by Custom Building Products, Seal Beach, CA; (562) 598-8808.
 - 3. LATICRETE® SpectraLOCK PRO Stainless Grout manufactured by Laticrete International, Inc., Bethany, CT; (800) 243-4788.
 - 4. Mapei Corporation, Deerfield Beach, FL; (888) 876-2734
- D. Crack Isolation Membrane: Provide shower pan waterproofing in accordance with Section 07115.

2.3 THRESHOLDS

- A. White Italian Marble thresholds shall be 1/2 inch thick by 2 inches wide by required length, with double 1/4 inch bevel.

2.4 EXPANSION JOINTS

- A. Expansion Joint Filler: Flexible and compressible, closed-cell type, rounded at surface to contact sealant as instructed by sealant manufacturer to suit intended use.
- B. Silicone compound sealant over filler. ASTM C920, Uses M and A, single component, mildew resistant. Sanded to match grout. Provide at all wall corners, ceilings, control joints and changes in materials, where floor tile abuts perimeter walls, curbs, columns, and pipes; and 24 feet to 36 feet elsewhere.

2.5 MISCELLANEOUS MATERIALS

- A. Cement-based Floor Leveling Material: ARDEX K-15 Self-Leveling Underlayment Concrete manufactured by Ardex Engineered Cements, Aliquippa, PA; (724) 203-5000; or CX Self-Leveling Underlayment manufactured by BASF Chemrex Inc.; or equal. Gypsum-based products are prohibited.
- B. Transition Strips: Of type and size recommended to suit application. Color shall be as selected by Architect from manufacturer's standard colors.

2.6 EXTRA TILE

- A. Deliver one (1) unopened box of each type and color of wall and floor tile to the Owner in accordance with Section 01710, Closeout Procedures.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Examination: Examine substrates for expansion joints and defects which may affect the work. Do not start work until defects have been corrected. Ensure that surfaces are:
 - 1. Dry, clean, free of oily or waxy films, free of curing compounds.
 - 2. Firm and level within specified tolerances.
 - 3. Minimum of 40 degrees and rising.
- B. Tile contractor shall examine preparatory work by others and notify Architect of any imperfections which would affect a satisfactory completion of this tile work. Verify that slab is free of cracks, waxy or oily films, and is well cured. Absence of such notification shall constitute acceptance of responsibility by tile contractor.

3.2 INSTALLATION

- A. Align joints (no staggering)
- B. Set interior floor tile and grout in accordance with TCA F113 and shower floor in accordance with TCA B415. Set marble thresholds in accordance with TCA TR611 and manufacturer's instructions.
- C. Set interior wall tile and grout in accordance with TCA W244 on tile backer cement board at wet areas, showers, and restrooms, TCA W243 on tile backer gypsum board at dry areas not exposed to water or moisture, and TCA W202 on concrete masonry unit (CMU) substrates.
- D. Allow minimum of 24 hours after tile is set before grouting.
- E. Lay out tile so that the minimum size tile used is 1/2 size.
- F. Form internal angles square.
- G. Install expansion joints in accordance with TCA publications EJ171.
- H. Slope tile within three (3) foot diameter of diameter of a floor drain, unless otherwise noted.
- I. Damp cure grout in accordance with manufacturer's recommendations. Clean all tile surfaces upon completion. Protect finish tile work from damage.

3.3 CLEANING AND PROTECTION

- A. Clean work at completion of installation, remove excess grout from tile surfaces. Clean tile and grout surfaces prior to installation of plumbing fixtures.
- B. Wipe all tile with a clean damp cloth, and buff lightly, leaving tile surfaces clean and ready to use.
- C. Remove grout from adjacent finish surfaces.
- D. Protect finished installation until final acceptance.

END OF SECTION

SECTION 09510
ACOUSTICAL LAY-IN CEILING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Suspension system (Grid) and accessories required to complete work.
- B. Acoustical lay-in panels: standard, fire rated, and sag resistant.
- C. Vinyl faced, sag resistant, scrubbable lay-in panels.
- D. Hold down clips, spacing clips, moldings, and accessories required to complete work.

1.2 RELATED WORK

- A. Section 09250 – Gypsum Wallboard Systems: Wallboard used as fire protection over light fixtures.
- B. Division 15 – Mechanical: Air diffusers and mechanical items penetration ceiling.
- C. Division 16 – Electrical: Lighting and electrical items penetrating ceiling.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Samples:
 - 1. 6 inch by 12 inch sample of each ceiling panel.
 - 2. 12 inch long sample of each type grid and actual accessories.

1.4 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 0110 – Notification of Architect Requirements.

1.5 REFERENCES

- A. ASTM International (ASTM)
 - 1. A641, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
 - 2. B117, Standard Practice for Operating Salt Spray (Fog) Apparatus
 - 3. C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - 4. C635, Standard Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 - 5. C636, Standard Practice for Installation of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings

6. D3273, Standard Test Method for Resistance to growth of Mold on the surface of Interior ceilings in an Environmental Chamber
 7. E84, Test Method for Surface Burning Characteristics of Building Materials
 8. E413, Classification for Rating Sound Insulation
 9. E1264, Standard Classification for Acoustical Ceiling Products.
- B. Federal Specification (FS)
1. SS-S-118B, Sound Controlling (Acoustical) Tiles and Panels
- C. Underwriters Laboratories (UL)
1. Assembly as specified or noted on drawings.

1.6 COORDINATION

- A. Coordinate Work of this Section with work under Division 15, Mechanical for location of dampers in diffusers and other mechanical items penetrating ceiling and Division 16, Electrical for location of light fixtures and other electrical items penetrating ceiling.

1.7 WARRANTY

- A. Standard ceiling Panels: warrant ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of one (1) year from the date of Substantial Completion.
- B. Sag Resistant ceiling Panels: warrant products to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects for a period of ten (10) years from the date of Substantial Completion.
- C. Standard Suspension System: Suspension systems shall be warranted to be free from defects in material or factory workmanship and shall not incur 50 percent red rust as defined by ASTM B117 test procedures for a period of ten (10) years from the date of Substantial Completion.
- D. Suspension System/Ceiling Panels: Provide manufacturers standard 15 year warranty for suspension systems when used in combination with same manufacturers sag resistant ceiling panels. Ceiling panels to be free from sagging, warping, shrinking, buckling, or delaminating as a result of manufacturing defects. Suspension systems shall not incur 50 percent red rust as defined by ASTM B117 test during the period of the warranty.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Specifications are based on products of named manufacturers. Manufacturers listed whose product meets or exceeds the specifications may be used on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.
1. Suspension System (Grid):
 - a. Armstrong World Industries, Inc. (Basis of Specification)
 - b. Certainteed (BPB Celotex)
 - c. Chicago Metallic
 - d. USG Interiors, Inc. (Donn)

2. Acoustical Lay-in Panels:
 - a. Armstrong World Industries, Inc. (Basis of Specification)
 - b. Certainteed (BPB Celotex/Capaul)
 - c. Conwed Designscales
 - d. USG Interiors, Inc.

2.2 MATERIALS

- A. Suspension System (Grid):
 1. Type: ASTM C635, intermediate duty; exposed T; components die cut and interlocking.
 2. Materials: Commercial quality cold rolled steel with galvanized coating.
 3. Exposed Grid Surface Width: 15/16 inch
 4. Grid Finish: White
 5. Accessories:
 - a. Perimeter moldings.
 - b. Hold down clips
 - c. Aluminum cap for use over steel grid in kitchen areas or where shown on drawings or required. White color.
 6. Approved Product/Manufacturer:
 - a. Fire Rated: Prelude XL 15/16 inch as manufactured by Armstrong World Industries, Inc. or Architect approved equal by acceptable manufacturers.
 - b. Non-Rated: Prelude XL 15/16 inch as manufactured by Armstrong World Industries, Inc. or Architect approved equal by acceptable manufacturers.
 7. Hanger Wire:
 - a. Galvanized carbon steel in accordance with ASTM A641, soft temper, prestretched, with a yield stress load of at least three (3) times the design load, but not less than 12 gauge in diameter.
- B. Lay-in Panels:
 1. Type "A": Standard
 - a. Material: Wet-formed mineral fiber.
 - b. Size: 24 inches by 24 inches by 5/8 inch thick
 - c. Edge Detail: Square lay-in, trim edge
 - d. NRC: 0.55 – 0.65 in accordance with ASTM E1264
 - e. CAC: 30 – 35 in accordance with ASTM E1264
 - f. Surface Finish: Factory applied white latex typical
 - g. Flame Spread: Class A
 - h. Fire Rating: Where indicated, provide UL Labeled for use in fire resistive assemblies in hourly rating required
 - i. Pattern: Perforated medium texture, non-directional
 - j. Accessories: Hold down clips as required for U.L. assembly
 - k. Specified Product/Manufacturer: "Cortega Square Lay-In Panels" No. 770 or fire-rated No. 824 FireGuard as manufactured by Armstrong World Industries, Inc.; or Architect approved equal by listed manufacturer.
 2. Type "B": Sag Resistant, Anti-microbial
 - a. Material: Wet-formed mineral fiber
 - b. Size: 24 inches by 24 inches by 5/8 inch thick
 - c. Edge Detail: Square lay-in, trim edge
 - d. NRC: 0.55 – 0.65 in accordance with ASTM E1264
 - e. CAC: 30 – 35 in accordance with ASTM E1264
 - f. Surface Finish: Factory applied latex typical. Architect to select color.
 - g. Flame Spread: Class A

- h. Fire Rating: Where indicated, provide UL Labeled for use in fire resistive assemblies in hourly rating required.
 - i. Pattern: Perforated medium texture, non-directional
 - j. Mold/Mildew inhibitor: Manufactures anti-microbial treatment in accordance with ASTM D3273.
 - k. Accessories: Hold down clips as required for U.L. assembly.
 - l. Specified Product/Manufacturer: "Fine Fissured Square Lay-In Panels" No. 1728 or fire-rated No. 1831 FireGuard as manufactured by Armstrong World Industries, Inc.; or Architect approved equal by listed manufacturer.
3. Type "C": (At Kitchen areas in grid with aluminum cap): Sag resistant
- a. Material: Vinyl-faced, Wet-formed mineral fiber
 - b. Size: 24 inches by 24 inches by 5/8 inch thick
 - c. Edge Detail: Square lay-in, trim edge
 - d. NRC: 0.10 – 0.15 minimum in accordance with ASTM E1264
 - e. CAC: 40 minimum in Accordance with ASTM E1264
 - f. Surface Finish: Scrubbable factory applied white vinyl plastic paint
 - g. Fire Resistance: Class A, UL labeled for use in fire resistive assemblies, where scheduled on drawings. One (1) hour fire rated roof/ceiling assembly.
 - h. Pattern: Non-perforated for use in commercial food service areas.
 - i. Mold/Mildew inhibitor: Manufactures anti-microbial treatment in accordance with ASTM D3273.
 - j. Approved Product/Manufacturer: "Clean Room VL" No. 868 as manufactured by Armstrong World Industries, Inc.; or Architect approved equal by listed manufacturer.
4. Type "E":
- a. Material: Fiberglass
 - b. Edge Detail/Grid: Square Lay-In
 - c. Pattern: Fine texture
 - d. Dimensions: 24 inches by 24 inches by 1 inch thick
 - e. Surface Finish: Factory-applied vinyl latex paint on woven, glass cloth scrim/White
 - f. ASTM Classification: Type: XII Form: 2 Pattern: 5
 - g. Acoustics:
 - 1) NRC: 0.95
 - 2) CAC: Not Applicable
 - 3) AC: 190
 - h. Fire Rating: Class A, UL labeled for use in fire resistive assemblies, as scheduled on drawings.
 - i. Light Reflectance: 0.83
 - j. Approved Products/Manufacturers: Painted Nubby Open Plan No. 3102 manufactured by Armstrong World Industries, Inc.; or Architect approved equal by listed manufacturers.

C. Accessories:

- 1. Shadow Molding: At all locations (whether detailed or not) where an acoustical lay-in ceiling abuts a gypsum board ceiling in the same plane, provide a "W" shaped reveal or "shadow" molding similar to USG No. MS 174.

2.3 EXTRRA STOCK

- A. At completion of work, deliver and store at site as directed not less than three (3) unopened cartons of each type of acoustical ceiling materials and as directed not less

than two (2) unopened cartons of Type "C" acoustical ceiling material. One (1) unopened box of suspension system material.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Insure that walls are flat and wall corners square. Commencing work shall be construed as acceptance of preceding work performed by others as suitable to receive Work of this Section.
- B. Insure that wall control joints are flat and will not cause wall mould to misalign at those locations.
- C. Coordinate all locations of cut panels with Architect in field prior to commencing work.
- D. Do not install any ceiling panel until all above plumbing work, ceiling inspections and corrections have been completed.

3.2 SUSPENDED CEILING SYSTEMS

- A. General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
 - 1. Standard for Installation of Ceiling Suspension Systems: comply w/ ASTM C636.
- B. Install ceiling systems by skilled workmen in accordance with manufacturer's printed instructions, the approved shop drawings and reflected ceiling plans. Exposed surfaces of acoustical units shall be level and flush, with all joints straight and true. Cutting and fitting around all items protruding through acoustical ceiling shall be done neatly. Edge moldings and runners shall have flush hairline joints, with all corners mitered. Pop rivets for joining members are not permitted.
- C. Typically, unless indicated on the drawings, install system so that panels are centered in the space in both directions to limit small cut pieces to minimum of three (3) inches on any side, or so that light fixtures are centered above work areas. If conflicts arise, notify architect immediately for determination and proper locations.
- D. Install main beam and cross tees in accordance with reflected ceiling plans. Suspend main beams from structure (but not bridging) above by means of 12 gauge galvanized wire, spaced at 4 feet –0 inches on center, both directions, wrapped tightly at least three (3) full turns. Do not hang wire supports from metal deck unless direct to do so by Architect and/or Structural Engineer. Powder actuated devices in metal deck are not permitted. Join cross tees to main beam with a positive interlock. Pop rivets will not be permitted for field splices.
- E. Align beams or tees with angle molding at corners unless authorized by Architect.
- F. At perimeter areas, secure angle molding to vertical surfaces, ends of tees to rest on bottom flange of molding. Attachment of cross tees to wall angles with pop rivets will not be permitted. Hanger wire at 45 degree approximately ten (10) inches long may be used to tie the grid to the wall above the ceiling to prevent eventual disengagement of the two (2) components.
- G. Install lay-in panels with accessories and hold down clips as shown or required.

END OF SECTION

SECTION 09650

RESILIENT BASE

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Resilient base adhesive attached in locations shown on drawings.

1.2 REFERENCES

- A. ASTM International (ASTM)
 - 1. F1861, Standard Specification for Resilient Wall Base
 - 2. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
 - 3. ASTM E 648 Critical Radiant Flux of 0.45 watts per sq. cm. Or greater, Class 1.
 - 4. ASTM E 662 (Smoke Generation) Maximum Specific Optical Density of 450 or less.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Samples:
 - 1. Actual samples or color charts showing manufacturer's full range of colors for Architect's selection.
 - 2. 12 inch long piece of base material in each color selected for approval.
- C. Certification: Manufacturer's affidavit that materials used in the Project contain no asbestos.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers named first are basis of Specification. Manufacturers listed, whose product meets or exceeds the specifications are approved for use on the Project with Architect's approval. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

Section 09650 - 1

2.2 MATERIALS – ALL MATERIALS MUST BE ASBESTOS FREE

- A. Rubber Base:
 - 1. Quality Standard: ASTM F1861
 - 2. Material: Rubber, vulcanized, Type TS, Group I, Styles A and B. Vinyl base and Type TP are not acceptable
 - 3. Type: Topset cove; (rolls)
 - 4. Thickness: Full 0.125 (1/8) inch
 - 5. Color: As selected by Architect
 - 6. Height: Four (4) inches, unless indicated otherwise
 - 7. Approved Products/Manufacturers: Burke Mercer, Flexco, Nora Rubber Products, Roppe Corp., Mannington Commercial, or Architect approved equal

Section 09650 - 1

- B. Joining and Edge Finish Moldings:
 - 1. Usage: For use at flooring terminations with other flooring.
 - a. Type: Tapered or bullnose edge, as required to provide juncture at edge of adjacent floor surfaces.
 - b. Size: One (1) inch wide by 1/8 inch thick or as applicable to the type of flooring and condition.
 - c. Material: Rubber or vinyl as recommended by flooring manufacturer to suit application.
 - d. Color(s): As selected by Architect from manufacturer's available colors.
 - e. Approved Manufacturers: Burke Mercer, Flexco, Johnsonite, Domco Tarkett, or Architect approved equal.
- F. Adhesive:
 - 1. Tile: Clear set type adhesive; same brand as tile or as instructed and approved by tile manufacturer to suit application.
 - 2. Base: Rubber-based type; same brand as base or as recommended and approved by base manufacturer to suit application.
- G. Other Materials: Provide other materials, not specifically described but required for a complete and proper installation.

2.3 EXTRA STOCK

- A. Deliver to the Owner for his use:
 - 1. Four (4) percent or one (1) unopened carton of each color, type, and size base selected, whichever is greater.
 - 2. One (1) gallon container of each type adhesive used for flooring and base.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Prepare concrete floors to receive flooring in accordance with ASTM F710.
- B. Verify substrates are smooth, level, at required finish elevation, and without more than 1/8 inch in 10 feet-0 inch variation from level or slopes shown on the drawings.
- C. Level substrates by grinding high spots or filling low spots with latex cementitious subfloor filler as required.
- D. Broom clean or vacuum the surfaces to be covered, and inspect the substrates.
- E. Verify substrates are smooth, level, at required finish elevation, and are ready to receive resilient tile flooring and base.
- F. Bring discrepancies to the attention of the Architect and do not proceed until such discrepancies are corrected.
- G. Conduct moisture test in accordance with ASTM F1869 – maximum allowable amount of moisture emission from floor is 3.0 pounds per 1,000 square feet in 24 hour period, and shall not exceed maximum allowable moisture content as allowed by flooring manufacturer.
- H. Starting Work indicates acceptance of existing conditions.

3.3 INSTALLATION

- A. General:

1. Install materials only after finishing operations, including painting, have been completed and after permanent heating and cooling system is operating.
 2. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturers of the materials used.
- B. Installing Base:
1. Install base where shown on the Drawings in accordance with manufacturer's instructions.
 2. Use factory-preformed exterior corners, and factory preformed or job-mitered interior corners.

3.4 CLEANING AND PROTECTING

- A. Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

END OF SECTION

SECTION 09900

PAINTING AND STAINING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and field application of paints and stains on interior substrates where shown or required.
- B. Surface preparation and field application of paints and stains on exterior substrates where shown or required.
- C. Surfaces not included, as applicable to the project, include, but are not limited to the following:
 - 1. Areas above finished ceiling or scheduled “unpainted” on the Finish Schedule of the drawings, except for those items within those spaces scheduled to painted.
 - 2. Exposed concrete, unless noted otherwise.
 - 3. Shop coat of paint on metal, except for damaged shop primer touch-up (unless noted otherwise).
 - 4. Structural steel and related items scheduled to receive sprayed fireproofing or encased in concrete.
 - 5. Face brick, unless otherwise noted.
 - 6. Natural stone.
 - 7. Aluminum and copper items, unless noted otherwise.
 - 8. Factory finished items other than prime painted to the field paint finished.
 - 9. Glass and glass masonry.
 - 10. Sealants of types which should not be painted and to which paint will not adhere.
 - 11. Plastic laminate items, such as doors, countertops, casework, etc.
 - 12. Acoustical ceiling and grid work, unless noted otherwise.
 - 13. Acoustical panels.
 - 14. Piping of copper, aluminum, and stainless steel.
 - 15. Stainless steel items.
 - 16. Ceramic or tile of any kind.
 - 17. Valves and controls.
 - 18. Sprinkler heads.
 - 19. Name plates on equipment.
 - 20. Fire rating labels, including those on fire rated doors and frames.
 - 21. Finish hardware, except that which is factory primed and designated as “BHMA 600”, if any, in Finish Hardware Section.
 - 22. Existing construction, unless noted otherwise.
 - 23. Materials not noted to be refinished or to receive a finish, except as noted, including, but not limited to the following:
 - a. Roofing
 - b. Asphalt paving, except for parking and lane striping, fire lane, and “wheel chair” handicapped access parking spaces.
 - c. Concrete paving and curbs, except for parking and lane striping, fire lane, and “wheel chair” accessible parking spaces.
 - d. Flooring, except those to receive game striping, or as noted.

24. Color coding of Mechanical Room pipes whether insulated or not: (Unless noted or directed otherwise)

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 1. D16, Standard Terminology for Paint, Related Coatings, Materials and Applications.

1.3 DEFINITIONS

- A. Conform to definitions of terms in ASTM D16 in interpreting requirements of this Section.

1.4 SUBMITTALS

- A. Material lists: Give the supplier's name, product name, number and generic description of each proposed product and its use. Provide product data sheets if so requested.
- B. Samples: Submit full range of colors, patterns, textures and finishes available for selection, including the following:
 1. Color Chips: Provide complete duplicate sets of color chips for color selection.
 2. Small Applied Samples: Provide pieces of actual material on which paint will occur with minimum dry mil thickness of specified paint. Provide painted 12 inch x 12 inch actual gypsum wallboard samples with approved textures for Architect's approval. Approved samples will become standard for which all work will be judged.
 3. Sheen Samples: Provide full range of varying sheens when sheens are controllable by intermixing.
- C. Installed Samples: Provide large size samples for approval. Approved samples may be left in place as part of the work.
- D. One room and/or area, as selected by the Architect, shall be painted with materials specified or accepted and applied directly from container, unthinned. After acceptance by Architect, room and/or area shall be standard of quality of entire project.
- E. Certification: Furnish a letter certifying that materials submitted are truly equivalent or better than those called out in the finish schedule.

1.5 RESPONSIBILITY OF COORDINATION

- A. Coordinate the work specified herein with the following work:
 1. Provide information to preceding trades for proper preparation of substrate.
 2. Inspect substrate before proceeding to verify proper preparation.
 3. Notify Architect of any item to receive paint which may not be covered by a scheduled finish type. Architect will furnish appropriate specification.

1.6 QUALITY ASSURANCE

- A. Materials:
 1. Delivery and Storage: Products shall be delivered to jobsite in unopened containers bearing manufacturer's labels intact and legible at time of use. Storage shall be in designated areas away from excessive heat and open flames

- and in accordance with manufacturer's recommendations.
2. Quality or Grade:
 - a. Paints and coatings shall be the manufacturer's highest professional quality material of types specified and shall be applied directly from containers in which material is purchased, except where thinning is recommended by manufacturer and approved by Architect to suit intended use, i.e. painting acoustical tile or panels without destroying their acoustical properties.
 - b. Primers and other undercoat paints shall be those produced by same manufacturer as finish coats.
 - c. Thinners shall be those recommended by paint manufacturer's printed instructions.
 3. Equipment:
 - a. Spray Equipment: Shall be the type recommended for the application and shall be maintained clean and in proper working order.
 - b. Brushes, Rollers, etc.:
 - 1) Shall be new of the various sizes and types recommended for each application.
 - 2) Shall be properly cleaned and stored in accordance with manufacturer's instructions at the end of each days' use.
 - 3) Shall be replaced as often as necessary to attain the best finish quality in the Work.
 4. Application:
 - a. Applicator:
 - 1) Shall be person(s) or entity specializing in application of paints and coatings of types specified with minimum five (5) years experience.
 - 2) Shall provide Owner and Architect a notarized certification that paint used is as specified.
 - b. Application:
 - 1) Shall not proceed on surfaces which are not suitable to be painted, until such surfaces have been corrected. Notify Architect in writing of which surfaces need to be corrected and their locations. Surfaces shall be corrected by the responsible trades. Surfaces not suitable for painting shall include, but not be limited to:
 - a) Damaged surfaces
 - b) Oily, greasy, dusty or excessively soiled surfaces
 - c) Non-dressed welds which will be exposed to view
 - d) Lack of touch-up where specified
 - e) Rusted or excessively deteriorated shop-prime painted surfaces
 - 2) Number of coats of each of several finishes shall be in accordance with detailed specifications, which will produce first quality finish if properly applied. If number of coats specified fails to produce a finish acceptable to Architect, this Contractor shall apply additional coat or coats at his own expense until acceptable finish is achieved.

1.7 PRODUCT HANDLING

- A. Store only approved materials at the jobsite, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.

- B. Temperature in the storage area shall be between 40 degrees F and 110 degrees F. Open and mix all materials in the storage area.
- C. Use all means necessary to protect materials before, during, and after application and to protect the installed work and materials of all other trades.
- D. Apply water-base paints only when temperature of surfaces to be painted and surrounding air temperatures are between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C), unless otherwise permitted by paint manufacturer's printed instructions.
- E. Apply solvent-thinned paints only when temperature of surfaces to be painted and surrounding air temperatures are between 45 degrees F (7 degrees C) and 85 F (35 degrees C), unless otherwise permitted by paint manufacturer's printed instructions.
- F. Do not paint in snow, rain, fog or mist, or when relative humidity exceeds 85 percent, or to damp or wet surfaces, unless otherwise permitted by paint manufacturer's printed instructions. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

1.8 EXTRA STOCK

- A. Upon completion of the work of this section, deliver to the Owner, an extra stock equaling ten (10) percent or a minimum of one (1) gallon, whichever is greater, of each color, type, and gloss of paint used in the work, tightly sealing each container and clearly labeling contents and location where used.

1.9 WARRANTY

- A. The undertaking of a painting subcontract will indicated that the subcontractor will warrant the work specified herein for two (2) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include by not be limited to the following:
 - 1. Discoloring noticeable by yellowing, streaking, blooming, changing color or darkening.
 - 2. Mildewing
 - 3. Peeling, cracking, blistering, alligatoring or releasing from the substrate
 - 4. Chalking or dusting excessively
 - 5. Changing sheen in or irregular fashion
 - 6. Softening or becoming tacky
 - 7. Bubbling
- C. In the event of damage, immediately make all repairs and replacements necessary for approval of the Architect and at no additional cost to the Owner.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. All paint materials selected for coating systems for each type of surface shall be the

product of a single manufacturer and shall, as a system, have flame spread, fuel contribution, and smoke density test results less than 25.

- B. Paint materials listed herein, unless otherwise designated in the "Painting Schedule", are the products of The Sherwin-Williams Company, 101 Prospect Avenue N.W., Cleveland, OH 44115, (800) 321-8194 and require no further approval as to manufacturer or catalogue number.
- C. Similar firstline material of the following manufacturers may be used subject to approval by the Architect for items indicated to be coated:
 - 1. Paints:
 - a. Benjamin Moore & Co.
 - b. Devoe Paint Company
 - c. Fuller O'Brien Paints
 - d. Martin-Senour Paints (Div. Of Sherwin Williams)
 - e. Monarch Paint Company
 - f. ICI Dulux Paints
 - g. Pittsburgh Paints, PPG Industries, Inc., Professional & High Performance Coatings
 - h. Porter Paints
 - i. Pratt & Lambert Paints (Div. Of Sherwin Williams)
 - j. Kelly-Moore Paint Co.
 - k. Kwal Paint
 - l. Tnemec Company Inc.
 - 2. Stains:
 - a. Olympic Stains, PPG Industries, Inc., Professional & High Performance Coatings
 - b. Samuel Cabot, Inc.
 - c. The Sherwin-Williams Co.

2.2 MATERIALS

- A. Paint and Coatings: Ready mixed, except for field catalyzed coatings; having good flow and brushing properties and consistent drying or curing behavior, free of sags and streaks.
- B. Accessory Materials: Linseed oil, turpentine, paint thinners and other materials recommended by paint and coatings manufacturer as necessary to achieve finishes specified.
- C. Patching and Surface Preparation: Latex fillers as recommended by paint and coatings manufacturer.

2.3 COLORS

- A. Colors shall be as selected by Architect. Different colors may be selected for each room, and more than one (1) color may be selected in each room.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that site environmental conditions are appropriate and substrates are in proper condition to receive Work of this Section.

- B. Verify that shop applied primers are compatible with specified finish coats.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not begin application of coatings unless moisture content of surfaces is below the following maximum values:
 - 1. Gypsum soffits: 12 percent
 - 2. Plaster: 12 percent
 - 3. Masonry surfaces: 12 percent
 - 4. Wood surfaces: 15 percent
 - 5. Vertical concrete surfaces: 12 percent
 - 6. Horizontal concrete surfaces: 8 percent

3.2 ITEMS TO RECEIVE PAINT

- A. Generally, all new items that are normally painted in any typical building, including but not limited to the following list:
 - 1. All ferrous metal
 - 2. All exterior galvanized metal
 - 3. All exterior wood
 - 4. All interior wood
 - 5. All prime coated hardware
 - 6. All exposed conduit, outlet boxes and electrical cabinets, excluding those located in mechanical rooms.
 - 7. All exposed pipe, plumbing, and ductwork, including those located in mechanical rooms.
 - 8. All metal grilles, except aluminum, unless otherwise indicated.
 - 9. All exposed gypsum board surfaces, including all mechanical rooms
 - 10. All exposed concrete masonry units (CMU), including all mechanical rooms.
 - 11. Miscellaneous other items which normally require painting or are scheduled to be painted.
 - 12. Consult plans, finish schedule, details and specifications for other trades as all items usually field painted or finish will be considered as part of the Contract.
 - 13. All exposed mechanical equipment and electrical equipment.
 - 14. Mechanical Room piping whether insulated or not insulated.
 - 15. All spray applied fireproofing in Mechanical Rooms.
 - 16. All cementitious wood fiber decks and exposed structure scheduled or noted to receive paint. Protect exposed wood structure from overspray.
- B. All work where a coat of material has been applied must be inspected and approved by Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Notify Architect when a particular coat has been completed for inspection and approval. Apply coats of material in strict accordance with manufacturer's specifications except where requirements of these specifications are in excess of manufacturer's requirements. Paint all sight exposed pipe and plumbing only after all mechanical work and tests have been completed.

3.3 PREPARATION

- A. General: Surface must be clean to insure adhesion. Remove oil and grease with paint thinner. Wash off dirt with warm soapy water and rinse with clean water. Remove rust by wire brushing or sanding.
- B. Wall surfaces must be dry before painting. Verify with moisture meter.

- C. Unfinished Surfaces:
1. Wood: Sand smooth and apply one (1) coat of Primer Undercoat. After primer has dried overnight, putty nail holes and cracks, then spot-prime putty with primer. Again, allow the primer to dry over-night, sand lightly and topcoat.
 2. Maonry and Concrete: Remove efflorescene or cement dust on masonry and concrete by etching with a 10 percent solution or muriatic (Hydrochloric) acid. Flush off surface after etching with clean water, and paint while still damp. On surface where muriatic acid cannot be used to neutralize the efflorescence, remove the efflorescence by sanding, scraping or wire brushing and apply a coat of Masonry Conditioner before painting. If efflorescence is not present, no primer is necessary on concrete and masonry surfaces. Fill voids and pores in concrete and haydite blocks with Latex Block Filler and allow to dry overnight before topcoating.
 3. Iron and Steel: Prime with Metal Primer and allow to dry overnight before topcoating.
 4. Galvanized Metal: Prime with galvanized metal primer and allow to dry overnight before topcoating.

3.4 APPLICATION

- A. General: Surfaces to be finished must be clean, dry and free of dirt, oils, loose paint or any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
- B. Paint Thickness: Provide the following minimum dry film thickness per coat unless noted otherwise:
1. Enamels on Metal: 1 mil
 2. Latex Paints: 1 mil
 3. Metal Primers: 1.5 mils
 4. Undercoats: 1.5 mils
 5. Oil Paints: 1.5 mils
 6. Epoxy Coating: 2.0 mils
- Thickness test: Use observation gauge that measures "V" shape scratch.
- C. Allow exterior paints to dry 72 hours between coats and interior paint to dry 24 hours between coats. Allow all enamels and varnishes to dry 24 hours between coats. If enamel and varnishes are tacky after 24 hours, allow additional time until finish is dry.
- D. Leveling: Apply with proper consistency and quality so paint flows out to a level surface free of brush and roller marks, bubbles, dust, runs, sags, and holidays. Spread evenly.
- E. Appearance: Uniform color, texture and sheen.
- F. Neatness: Paint shall not be smeared, spattered or run over adjoining colors or materials. Cut-on lines shall be straight.
- G. First coat shall be white, unless otherwise specified.

3.5 CLEANING AND PROTECTION

- A. Keep project premises free of painting-related debris. Collect material that may constitute a fire hazard, place in closed metal containers, and remove daily from site.

- B. Protect work adjacent to painting operations from paint spatters and spills. Immediately remove paint that falls on finished surfaces not scheduled to receive paint, using materials and techniques that will not damage affected surfaces.

3.6 SCHEDULE

- A. The following is a schedule of typical painted items and does not specifically include every item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.
- B. Exterior Surfaces: Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows, and oranges) are specified and/or when a graffiti resistant coating is required.
1. Galvanized Metal:
 - a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to being painting operations.
 - b. Primer: One (1) coat DTM Primer/Finish (B66W1)
 - c. Finish: Two (2) coats DTM Acrylic Gloss (B66 Series)
 2. Un-galvanized Metal:
 - a. Primer: One (1) coat Kem Kromik Universal Primer (B50Z Series)
 - b. Finish: Two (2) coats DTM Acrylic Gloss (B66W1)
 3. Concrete and CMU:
 - a. Primer: One (1) coat PrepRite Block Filler (B25W25)
 - b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 Series)
 4. Wood (Includes plywood siding and wooden trim):
 - a. Primer: One (1) coat A-100 Latex Wood Primer (B42W41)
 - b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 ser.)
 5. Fiber-Cement Materials:
 - a. Primer: One (1) coat Loxon Masonry Primer (A25W300)
 - b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 Series)
 6. Parking Line and Driveway Paint: Setfast Waterbone Yellow (TM225) (meets Federal Specification (FS) TTP-1952-B)
 7. All Piping in mechanical rooms shall be painted in their entirety, in the following colors:
 - a. Gas lines: Orange
 - b. Domestic cold water: White
 - c. Domestic hot water: Pink
 - d. Heating hot water: Red
 - e. Condenser water: Green
 - f. Chilled water: Blue
- C. Interior Surfaces:
1. Galvanized Metal:
 - a. Primer: One (1) coat DTM Acrylic Primer/Finish (B66W1)
 - b. Finish: Two (2) coats ProClassic Waterborne Acrylic Gloss (B31 Series)
 2. Gypsum Wallboard:
 - a. Primer: One (1) coat PrepRite 200 Latex Primer (B28W200)
 - b. Finish: Two (2) coats ProMar 200 Latex Eg-Shel (B20-200 Series)
 3. Concrete and CMU: (Enamel)
 - a. Primer: One (1) coat PrepRite Block Filler (AB25W25)
 - b. Finish: Two (2) coats ProMar 200 Latex Semi-Gloss (B31-200 Series)
 4. Wood: (Painted)

- a. Primer: PrepRite Classic Latex Primer (B28W101)
 - b. Finish: ProClassic Waterborne Semi-Gloss (B31 Series)
- 5. Wood: (Stained)
 - a. Stain: Wood Classics Interior Stain (A49-200 Series)
 - b. Finish (First Coat): Wood Classics Polyurethane Varnish (A67 Series)
 - c. Finish (Second Coat): Wood Classics Polyurethane Varnish (A67 Series)
- 6. Gypsum Wallboard: (Epoxy) – Classrooms, Kitchens, Restrooms, etc.
 - a. Primer: One (1) coat PrepRite 200 Latex Primer (B28W200)
 - b. Finish: Two (2) coats Water-Based Catalyzed Epoxy (B70/B60)
- 7. CMU: (Epoxy) – Kitchens, bathrooms, etc.
 - a. Primer: Two (2) coats Heavy Duty Block Filler (B42W46)
 - b. Finish: Two (2) coats Water-Based Catalyzed Epoxy (B70/B60)

END OF SECTION

SECTION 10101

MARKERBOARD AND TACKBOARD

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUBMITTALS

- A. Shop Drawings: Indicate sizes and layout, method of attachment, accessories, trim, details and finish.
- B. Product Data: Manufacturer's specifications and other data needed to prove compliance with the specified requirement.
- C. Manufacturer's installation instructions.
- D. Samples: Include color charts showing manufacturer's full range of colors for Architect's selection.

1.2 WARRANTY

- A. Warrant the Work specified herein against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship for the following terms:
 - 1. Markerboards: Minimum of 50 years or for the life of the installation.
 - 2. Tackboards: Minimum five (5) years.
- B. Defects shall include, but not be limited to, the following:
 - 1. Noticeable deterioration of finish.
 - 2. Writing surface delamination
 - 3. Fabric discoloration, tearing, or delamination
 - 4. Unit releasing from substrate

PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.
 - 1. Aarco Products, Inc.
 - 2. ADP Lemco Incorporated, (Alinc)
 - 3. Best Rite Manufacturing
 - 4. Claridge Products and Equipment, Inc.
 - 5. Marsh Industries, Inc.
 - 6. Newline Products, Inc.
 - 7. Polyvision

- B. Specifications are based on products of Claridge Products and Equipment, Inc., Harrison, AK (870) 743-2200

2.2 MATERIALS

- A. Markerboards (MB):
1. Material: 24 gauge porcelain enamel steel similar to "Liquid Chalk Surfaces (LCS)" with the ability to use liquid chalk writing system markers and magnets, mounted on 3/8 inch hardboard core, with aluminum foil backing (1/2 inch total thickness).
 2. Sizes: Four (4) feet high, unless noted otherwise x length shown on drawings. One (1) piece length through 16 feet.
 3. Color: As selected by Architect from manufacturer's standard colors.
 4. Accessories:
 - a. Marker Trough: Similar to No. 371A marker trough with extended rear flange and endcaps under all markerboards.
 - b. Edge Trim:
 - 1) Extruded aluminum snap on trim, similar to No. 273A
 - 2) Color: Dull satin anodized, natural.
 - c. Map Rail: Similar to No. 275A across top of markerboard.
 - d. Map Clips: Similar to No. 76M, four (4) per markerboard.
 - e. Mounting clips: Similar to No. 277 concealed ground clips at top and sides.
 - f. Flag Holder: No. 76 F.H.; provide two (2) per board.
 5. Locations: As shown on drawings or required.
- B. Tackboard (TB):
1. Vinyl plastic mounted on 1/4 inch resilient cork over 1/4 inch hardboard underlayment (1/2 inch total thickness).
 2. Type: Similar to "Fabricork"
 3. Color: As selected by Architect from manufacturer's standards
 4. Accessories:
 - a. Edge Trim:
 - 1) Extruded aluminum snap on trim, similar to No. 273A
 - 2) Color: Dull satin anodized, natural.
 - b. Mounting clips: Similar to No. 277 concealed ground clips
 5. Sizes/Locations: As shown on drawings or required.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Field assemble and install markerboards and tackboards in accordance with manufacturer's printed instructions.
- B. Rigidly anchor to backup materials to withstand 200 plf load. Set without mastic on gypsum board partitions.
- C. Install trim plumb with joints closely fitted and corners mitered. Secure trim with fasteners spaced 16 inches on centers maximum. Provide screws in lead shield on concrete and

masonry walls and direct attachment to studs or metal backing on drywall construction. Use concealed fasteners.

- D. Markerboard: Secure marker trough to backup materials with concealed fasteners through rear flange. Slip markerboard into carrier slot. Then, install side and top ground clips and trim in accordance with manufacturer's printed instructions.
- E. Provide all ground, brackets, anchors, trim, and accessories for a complete installation.

END OF SECTION

SECTION 10400

IDENTIFYING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Identifying devices required for this work includes building identification, site identification and room signage.

1.02 QUALITY ASSURANCE

- A. For installation use only personnel who are skilled in the work required.

1.03 SUBMITTALS

- A. Shop Drawings: Submit shop drawings in accordance with Section 01340.
- B. Installation Methods: Submit two copies of manufacturer's recommended installation methods showing all requirements for blocking and bracing.

1.04 PRODUCT HANDLING

- A. Protection: Protect identifying devices before, during and after installation; protect installed work of other trades.
- B. Replacements: In the event of damage, make necessary replacements.

PART 2 PRODUCTS

2.01 BUILDING IDENTIFICATION (BASE BID)

- A. General: Provide one set of letter to identify building. Letters required: *San Carlos Community Resource Center* (8" caps, 6" lower case), *Hidalgo County Precinct No. 4* (4" caps, 3" lower case).
- B. Materials:
 - 1. Manufacturer: Southwell Co.
 - 2. Type: Ribbon S-905
 - 3. Size: 8"/6" and 4"/3"
 - 4. Finish Color: Clear Satin Finish, with topcoat
 - 5. Mounting Type: Projected Mount
- C. Other Manufacturers: ARK Ramos Foundry and Manf. Co.

2.02 ROOM SIGNAGE

- A. Allowance: Comply with ADA provisions. Refer to Section 01020.

2.03 SITE SIGNAGE

Not Used.

2.04 HANDICAPPED SIGNAGE/STREET SIGNAGE

- A. Separate Contract (by others).

2.05 BUILDING PLAQUE

- A. Aluminum plaque as per drawing on sheet 0.0 Mfr.: Southwell Co.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection:
 - 1. Inspect installed work of other trades and verify that such work is complete to a point where this work may commence.

Section 10400-1

2. Verify that installation may be made in accordance with approved shop drawings and manufacturer's instructions.
- B. Discrepancies:
 1. In event of discrepancy, notify Architect.
 2. Do not proceed with installation until discrepancies have been resolved.

3.02 INSTALLATION

- A. Install where indicated, anchoring all components firmly in place in complete accordance with approved shop drawings and the manufacturer's recommendations.
- B. Room signs to be mounted on wall surfaces on the strike side of doors at approximately 60 inches above the floor and within 8 inches from the outside edge of the doorframe.
- C. Reserved parking sign and traffic signs shall be located in accordance with the latest requirements of Texas State Purchasing and General Services Commission Building and Property Services Division and the Texas Highway Department.

END OF SECTION

SECTION 10800
TOILET ROOM ACCESSORIES

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Toilet accessories; shower accessories; and utility room accessories.

1.2 RELATED SECTIONS

- A. Section 06112 – Rough Carpentry
- B. Section 09250 – Gypsum Board Assemblies
- C. Section 09310 – Ceramic Tile
- D. Division 16 - Electrical

1.3 OWNER FURNISHED CONTRACTOR INSTALLED ITEMS

- A. Contractor shall furnish and install other items specified or shown on drawings.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and technical data.
 - 2. Manufacturer's installation instructions.
 - 3. Manufacturer's operation and maintenance instructions of units specified.
 - 4. Provide schedule of materials and installation locations.
- B. Shop drawings: Indicate size, material and finish. Show locations, installation procedures. Include details of joints, attachments, fasteners, clearances, and mounting heights.

1.5 MINIMUM COMPLIANCE STANDARDS

- A. Comply with ANSI A117.1 and Texas Accessibility Standards (TAS) and with referenced standards specified with each product or material.

1.6 QUALITY STANDARDS

- A. Design, finish and keying of items shall be the same.
- B. Furnish items from one (1) manufacturer only unless otherwise specified or directed by Architect.

1.7 PRE-INSTALLATION CONFERENCE

- A. Refer to Section 01110 – Notification of Architect Requirements.

1.8 COORDINATION

- A. Coordinate the Work with placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

1.9 WARRANTY

- A. Warrant the work specified herein for three (3) years, or provide manufacturer's standard warranty for specified products, against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.
- B. Defects shall include, but not be limited to:
 - 1. Delamination or deterioration of finish
 - 2. Noisy, rough or difficult operation
 - 3. Failure to meet specified quality assurance requirements

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers listed whose products meet or exceeds 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. A & J Washroom Accessories
 - 2. American Specialties, Inc. (ASI)
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corp.
 - 5. Koala Bear Kare (Diaper Changing Station)
- B. Specifications are based on products of Bobrick Washroom Equipment, Inc., (281) 362-7515

2.2 COMPONENTS

- A. Accessories – General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Stainless Steel:
 - 1. Stainless Steel Sheet: ASTM A666 Type 302 or 304
 - 2. Stainless Steel Tubing: ASTM A269, stainless steel
 - 3. Finish: No. 4 satin, unless otherwise specified
 - 4. Thickness: 22 US Stainless gauge minimum
- C. Chromium Plating:
 - 1. Method: Over nickel
 - 2. Standard: ASTM C456, Type SC 2
- D. Mirrors (Framed):
 - 1. Standard: FS DD-G-451-C, silvering quality No. 1 float or plate
 - 2. Thickness: 1/4 inch
 - 3. Backing: Electrolytic copper
 - 4. Protection: Padding and filler strips

- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.
- G. Backing: concealed backing to comply with local codes and as required for substrate conditions; or manufacturers standard mounting kits.

2.3 FINISHING

- A. Stainless Steel: No. 4 satin brushed, typical on all accessories, unless otherwise noted.
- B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats vitreous enamel.
- C. Chrome/Nickel Plating: satin finish
- D. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake
- E. Back paint components where contact is made with building finishes to prevent electrolysis

PART 3 – EXECUTION

3.1 MOUNTING LOCATIONS

- A. Comply with ADA and TAS requirements. Refer to drawings. When not shown, submit supplier's recommendations for locations and mounting height before proceeding.
- B. Contractor shall be responsible for supplying all opening, blocking, and other components necessary for installation of all toilet accessories.
- C. Use approved theft-resistant type fasteners.

3.2 SCHEDULE

- A. As a quality standard, Model Numbers shown which are not Owner furnished are products of Bobrick Washroom Equipment, Inc., unless noted otherwise.

WASHROOM EQUIPMENT

1. TA-1 – Soap Dispensers:
 - a. Mounting: Surface
 - b. Model No.: B-2112
 - c. Locations: One (1) at each lavatory. Refer to drawings.
2. TA-2 – Mirrors:
 - a. Mounting: Surface
 - b. Model No.: B-290
 - c. Size/Locations: 24 inches x 48 inches, unless shown otherwise. One (1) at each lavatory. Refer to drawings.
3. TA-3 – Toilet Paper Dispenser:
 - a. Mounting: Surface
 - b. Model No.: B-264
 - c. Locations: One (1) at each water closet. Refer to drawings.
4. TA-4 – Paper Towel Dispenser:
 - a. Model No.: Kimberly-Clark 09765

- b. Locations: Refer to drawings
- 5. TA-5 – Grab Bars: (At Typical Accessible Toilet Stalls)
 - a. Size/Finish: 1-1/2 inch diameter Satin Finish Stainless Steel
 - b. Clearance: 1-1/2 inch between rail and wall
 - c. Model No.: B-6806
 - d. Mounting: Attach with concealed mounting. Mount parallel to floor
 - e. Location: One (1) 36 inch behind toilet, and one (1) 42 inch long bar at side of toilet, at each accessible stall. Refer to drawings.
- 6. TA-7 – Sanitary Napkin Disposal:
 - a. Mounting: Surface
 - b. Model No.: B-270
 - c. Locations: One (1) at each Women's toilet room and Area 'C' girls toilet rooms. Refer to drawings.
- 7. TA-8 – Mop and Broom Holder:
 - a. Mounting: Surface
 - b. Model No.: B-239 x 34
 - c. Capacity: Four (4) hooks, three (3) mop holders
 - d. Location: One (1) above mop sink at each custodial room whether indicated or not. Refer to drawings.
- 8. TA-9 – Grab Bars: (At Accessible Shower)
 - a. Mounting: Surface
 - b. Model No.: B-6861 modified (24 x 16)
 - c. Location: One (1) at each accessible shower stall. Refer to drawings.
- 9. TA-10 – Folding Bench:
 - a. Mounting: Surface, reversible
 - b. Models: B-5181 (Use Bradley No. 9561 at elementary schools 15 inch seat height)
 - c. Location: One (1) at each accessible shower stall
- 10. TA-11 – Clothes Hook:
 - a. Mounting: Surface
 - b. Model No.: B-6717; or equivalent
 - c. Location: One (1) hook inside door at single toilet rooms unless noted otherwise.
 - d. Toilet Partitions: Hook provided by toilet partition manufacturer included in standard hardware package in accordance with Toilet Partition Section; unless noted otherwise.
- 11. TA-12 – Shower Curtains, Rods and Hooks:
 - a. Model Nos.:
 - 1) Rods: B-6047 (36 inches or as indicated)
 - 2) Curtains: 204-2 (42 inches x 72 inches or as required)
 - 3) Hooks: 204-1 (Seven (7) hooks per curtain or as required)
 - 4) Mounting/Location: One (1) at each accessible shower. Refer to drawings.
- 12. TA- 13 – Electric Hand Dryer
 - a. Mounting: Surface Mounted
 - b. Model No.: B-7120, White
 - c. Voltage: 115 VAC, 15 amp, 1725 watts, 60 HZ
 - d. Location: Refer to drawings
- 13. TA-15 – Grab Bars: (At Additional Accessible Toilet Stalls)
 - a. Size/Finish: 1-1/2 inch diameter Satin Finish Stainless Steel
 - b. Clearance: 1-1/2 inch between rail and wall
 - c. Model No.: B-6806
 - d. Mounting: Attach with concealed mounting. Mount parallel to floor
 - e. Location: One (1) 36 inch at each side of toilet, at each accessible stall. Refer to drawings.

END OF SECTION

SECTION 10950

FIRE EXTINGUISHER AND CABINETS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and technical data to indicate specification compliance.
 - 2. Manufacturer's installation instructions.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Specifications are based on the products of named manufacturers. Other listed manufacturers who produce products equivalent to those specified are approved for use on the Project. Other manufacturers must have a minimum of five (5) years experience manufacturing equivalent to those specified and comply with Division 1 requirements regarding substitutions to be considered.

- 1. Larsen's Manufacturing Co.
 - 2. The Williams Bros. Corporation of America
 - 3. J. L. Industries, Inc.
 - 4. Potter-Roemer

2.2 MATERIALS

- A. Fire Extinguisher Cabinets (FEC):
 - 1. Size: 24 inches x 9-1/2 inches x 6 inches inside tub dimension
 - 2. Type: Semi-recessed with 2-1/2 inch return trim rolled edge; ADA compliant
 - 3. Tub Construction: 22 gauge min. steel with standard baked acrylic enamel interior finish
 - 4. Door and Frame: 18 gauge min. 304 stainless steel door and frame with vertical decal lettering "FIRE EXTINGUISHER" in red color, unless directed otherwise by Architect
 - 5. Glazing: clear acrylic "Duo" vertical glazing panel
 - 6. Hardware: Continuous concealed piano hinge constructed of material which matches door and trim material. Satin finish pull handle with cam cylinder lock with safety pull designed to release upon firm pull on handle (Larsen's "Larsen-Loc"™, J. L. Industries "Saf-T-Lok"™; or equivalent)
 - 7. Bracket: Hook type; Larsen's #1007, or equal
 - 8. Finish of Exterior: #4 Stainless steel
 - 9. Fire rating: as occurs, provide fire rated cabinet, for one or two hour rated conditions as indicated or required by specific location. Cabinet shall be tested and approved by Warnock Hersey to ASTM E-814, and shall bear the Warnock Hersey label.

- B. Fire Extinguisher (F.E.):
 - 1. Models/Types:

- a. Multipurpose dry chemical with 10 lbs. Capacity and UL 4A-60B: C rating
 - b. Multipurpose dry chemical with 5 lbs. Capacity and UL 2A-10B: C rating conforming to MP5 Series
- 2. Mounting: Provide eye brackets for direct wall mounting to hook and for mounting in Fire Extinguisher cabinets. Refer to drawings for location and quantity.
- 3. Provide initial inspection tag for each extinguisher.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install fire extinguisher cabinets in openings prepared by others in accordance with manufacturer's printed instructions.
- B. Install fire extinguisher cabinets in locations required by governing code and as directed by Owner.

END OF SECTION