

PROJECT MANUAL

MIDLAND COUNTY

Midland County Sheriff's Office Utilities

Midland, Texas



July | 2024

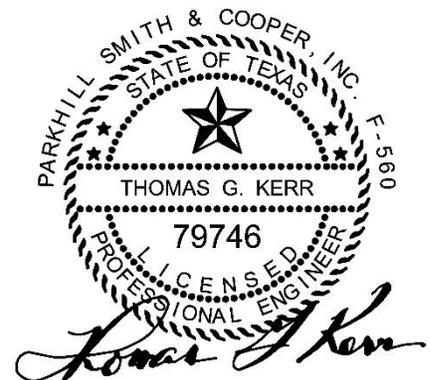
Parkhill Project #4156323

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07/12/2024

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TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

Owner Provided

00 41 00 Bid Form 7

DIVISION 01 – GENERAL REQUIREMENTS

01 10 00 Summary 4
01 20 00 Price and Payment Procedures 5
01 22 00 Measurement and Payment 6
01 25 00 Substitution Procedures 2
01 30 00 Administrative Requirements 4
RFI Form
AIA Document C106 – Digital Data Licensing Agreement
01 32 16 Construction Progress Schedule 4
01 32 33 Photographic Documentation..... 2
01 33 00 Submittal Procedures 6
01 40 00 Quality Requirements 3
01 50 00 Temporary Facilities and Controls..... 6
01 57 23 Temporary Stormwater Pollution Control 2
01 60 00 Product Requirements 2
01 70 00 Execution and Closeout Requirements 7

DIVISION 02 – EXISTING CONDITIONS

Not Used

DIVISION 03 - CONCRETE

03 10 00 Concrete Forming and Accessories 7
03 20 00 Concrete Reinforcing 5
03 30 00 Cast-In-Place Concrete 9

DIVISIONS 04 – 28

Not Used

DIVISION 31 – EARTHWORK

31 10 00 Site Clearing 3
31 23 16.13 Trenching 3
31 23 19 Dewatering 5
31 23 23 Fill 4
31 50 00 Excavation Support and Protection 3

DIVISION 32 – EXTERIOR IMPROVEMENTS

Not Used

DIVISION 33 - UTILITIES

33 01 10.58 Disinfection of Water Utility Piping Systems 3
33 01 30.11 Television Inspection of Sewers 3
33 05 05.31 Hydrostatic Testing 3
33 05 05.36 Vacuum Testing 3
33 05 05.41 Air Testing 2
33 05 05.43 Mandrel Testing 2
33 05 07 Trenchless Installation of Utility Piping 6
33 05 09.33 Thrust Restraint for Utility Piping 6
33 05 63 Concrete Vaults and Chambers 8
33 05 76 Fiberglass Manholes 5
33 05 97 Identification and Signage for Utilities 3
33 14 13 Public Water Utility Distribution Piping 9
33 14 17 Site Water Service Utility Laterals 4
33 14 19 Valves and Hydrants for Water Utility Service 5
33 11 11 Public Sanitary Sewerage Gravity Piping 7

DIVISIONS 34 - 35

Not Used

DIVISION 40 - PROCESS INTEGRATION

40 05 78.13 Air/Vacuum Valves for Water Service 4

DIVISIONS 41 - 48

Not Used

SECTION 00 41 00 - BID FORM

The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to:
Midland County Purchasing Department
Midland County Courthouse
Attention: Kristy Engeldahl, Purchasing Agent
500 N. Loraine Street
Suite 1101
Midland, Texas 79701

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2—ATTACHMENTS TO THIS BID

- 2.01 The following documents are submitted with and made a condition of this Bid:
 - A. Required Bid Security;
 - B. List of Proposed Subcontractors;
 - C. List of Proposed Suppliers;
 - D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
 - E. Contractor’s license number as evidence of Bidder’s State Contractor’s License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;
 - F. Required Bidder Qualification Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

- 3.01 *Unit Price Bids*
 - A. Bidder will perform the following Work at the indicated unit prices:

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
1	Mobilization/Demobilization (Max 5% of Total Bid Amount)	LS	1	\$	\$
2	Subsurface Utility Investigation (SUI) Lvl 'A'	LS	1	\$	\$
3	Stormwater Pollution Prevention Plan and Erosion Control	LS	1	\$	\$

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
4	Traffic Control	LS	1	\$	\$
5	Trench Safety (Water & Wastewater)	LF	15,050	\$	\$
6	Warning Tape & Tracer Wire (Water & Wastewater)	LF	15,050	\$	\$
7	Dewatering (Calendar Days)	DAYS	60	\$	\$
8	Asphalt Paving – Saw Cut Pavement Edges, Remove & Replace	SY	1,571	\$	\$
9	Concrete Paving – Saw Cut Concrete Pavement Edge, Remove & Replace	SY	333	\$	\$
10	Gravel Paving – Remove & Replace	SY	2,518	\$	\$
11	Rip Rap – Remove & Replace	SY	21	\$	\$
12	Mailbox – Remove, Reinstall, or Replace	EA	4	\$	\$
13	Roadway Sign – Remove & Replace	EA	10	\$	\$
14	Driveway Culvert Pipe – Remove & Replace	LF	157	\$	\$
15	Chain Link Fence – Remove & Replace	LF	240	\$	\$
16	Parking Lot – Re-Stripe Damaged Striping	LS	1	\$	\$
WASTEWATER					
17	Gravity Wastewater Pipe - 8" PVC DR26 ASTM D3034	LF	6,614	\$	\$
18	Gravity Wastewater Pipe - 6" DR 26 ASTM D3034	LF	625	\$	\$
19	Manhole (0-6' Depth)	EA	21	\$	\$
20	Manhole Over Standard Depth (Vf > 6')	VF	48	\$	\$
21	16" Steel Casing Bore (T=0.375")	LF	151	\$	\$
22	Casing - Wastewater Line Crossing Water Line	EA	4	\$	\$
23	Casing - Wastewater Line Crossing Petroleum Line	EA	7	\$	\$
24	Connection - Existing 36" Wastewater Trunk	EA	1	\$	\$
25	Connection - Existing 4" Service Line	EA	6	\$	\$
26	Wastewater Cap & Plug - 8"	EA	2	\$	\$
27	Cleanout - 6"	EA	2	\$	\$

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
28	Decommissioning - OSSF #1, OSSF#2, & OSSF#3	LS	1	\$	\$
WATER LINE					
29	Water Line - 12" PVC C900 DR18	LF	7,650	\$	\$
30	Water Line - 6" PVC C900 DR18	LF	120	\$	\$
31	Water Line - 2" PVC Sch. 40 ASTM D1784	LF	39	\$	\$
32	Ductile Iron Fittings	TON	4	\$	\$
33	20" Steel Casing Bore (T=0.375")	LF	65	\$	\$
34	Casing - Water Line Crossing Wastewater Line	EA	2	\$	\$
35	Casing - Water Line Crossing Petroleum Line	EA	7	\$	\$
36	Precast Concrete Vault And 6" Water Meter Assembly	LS	1	\$	\$
37	Fire Hydrant Assembly	EA	4	\$	\$
38	12" Bollards	EA	8	\$	\$
39	Gate Valve with Box - 12"	EA	12	\$	\$
40	Gate Valve with Box - 4"	EA	3	\$	\$
41	Combination Air / Vac Valve & Vault	EA	4	\$	\$
42	12" Plug	EA	2	\$	\$
43	4" Cut & Plug	EA	2	\$	\$
44	2" Cut & Plug	EA	1	\$	\$
45	Connection To Existing 12" Water Main	EA	1	\$	\$
46	Connection To 4" Water Line	EA	2	\$	\$
47	Connection To 2" Service Line	EA	1	\$	\$
Total of All Unit Price Bid Items					\$

- B. Bidder acknowledges that:
- each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and
 - estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

3.02 *Total Bid Price (Lump Sum and Unit Prices)*

Total Bid Price (Total of all Lump Sum and Unit Price Bids)	\$
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ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

- 5.01 *Bid Acceptance Period*
 - A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.
- 5.02 *Instructions to Bidders*
 - A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security.
- 5.03 *Receipt of Addenda*
 - A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

- 6.01 *Bidder’s Representations*
 - A. In submitting this Bid, Bidder represents the following:
 1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
 2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions, or by definition, with respect to the effect

of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Bidder.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
 - a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

[typed or printed name of organization]

By:

[individual's signature]

Name:

[typed or printed]

Title:

[typed or printed]

Date:

[typed or printed]

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest:

[individual's signature]

Name:

[typed or printed]

Title:

[typed or printed]

Date:

[typed or printed]

Address for giving notices:

Bidder's Contact:

Name:

[typed or printed]

Title:

[typed or printed]

Phone:

Email:

Address:

Bidder's Contractor License No.: (if applicable)

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Contract description.
 - 3. Work by Owner or others.
 - 4. Owner-furnished products.
 - 5. Contractor's use of Site.
 - 6. Work sequence.
 - 7. Work restrictions.
 - 8. Owner occupancy.
 - 9. Permits.
 - 10. Specification conventions.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 20 00 "Price and Payment Procedures."
 - 3. Section 01 32 16 "Construction Progress Schedule:" Digital project management procedures and web-based project management software package.
 - 4. Section 01 50 00 "Temporary Facilities and Controls:" Limitations and procedures governing temporary use of Owner's facilities.
 - 5. Section 01 70 00 "Execution and Closeout Requirements:" Coordination of Owner-installed products.

1.2 PROJECT INFORMATION

- A. Name: Midland County Sheriff Office Utilities.
 - 1. Project Location: Midland County, Texas.
- B. Owner : Midland County.
 - 1. Owner's Representative: Andrew Avis, Director of Public Works.
- C. Project Engineer: Parkhill.
 - 1. Engineer's Representative: Thomas G. Kerr, P.E.
- D. Construction Manager: Parkhill.
 - 1. Construction Manager Representative: Thomas G. Kerr, P.E.
 - 2. Construction Manager as advisor (CMa): Construction Manager has been engaged for this Project to serve as an advisor to Owner and to provide assistance in administering the Contract for construction between Owner and Contractor, according to a separate contract between Owner and Construction Manager.
 - a. Construction Manager also serves as Project coordinator, as defined below:
 - 1) Project coordinator shall be responsible for coordination between the General Construction Contract and Owner.
- E. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 01 32 16 "Construction Progress Schedule," for requirements for using web-based Project software.

1.3 CONTRACT DESCRIPTION

- A. Work of the Project includes construction of water and wastewater utility extensions from IH 20 South Frontage Road to 1703 ECR 120, Midland County, Midland County Sheriff Office Facilities. Inclusive of approximately 7,650 linear feet of 12-inch C90 DR18 water main, 6-inch Domestic Compound Water Meter Vault & Assembly, 20-inch steel casing bore, 4 fire hydrant assemblies, valves and accessories; and 7,239 linear feet of 8-inch and 6-inch PVC DR26 gravity sewer pipe, 21 manholes, three 16-inch steel casing bores, decommissioning 3 on-site sewerage facilities, water and sewer service connections, fire service connection, numerous pipeline crossing encasements, traffic control, trenching, trench protection, stormwater protection, labor, material and equipment required for complete installations.
- B. Perform Work of Contract under Stipulated Sum Contract with Owner according to Conditions of Contract.

1.4 CONTRACTOR'S USE OF SITE

- A. Restricted Use of Site: Contractor shall have limited use of Project Site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project Site to Work in areas within the Contract limits indicated. Do not disturb portions of Project Site beyond areas in which the Work is indicated.
- C. Limits on Use of Site: Confine construction operations to area necessary for Work.
 - 1. Limit use of Site to allow:
 - a. Owner occupancy.
 - b. Work by Owner.
 - c. Work by Others.
 - d. Use by the public.
 - 2. Driveways, Walkways, and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on Site.
- D. Construction Operations: Limited to areas indicated on Drawings.
- E. Utility Outages and Shutdown:
 - 1. Coordinate and schedule electrical and other utility outages with Owner.
 - 2. Outages: Allow only at previously agreed upon times.
 - 3. At least 1 week before scheduled outage, submit outage request plan to Engineer itemizing dates, times, and duration of each requested outage.
- F. Construction Plan: Before start of construction, post electronic file to Project website of construction plan regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

1.5 WORK SEQUENCE

- A. Construct Work in stages during construction period. Coordinate construction schedule and operations with Engineer:
 - 1. Stage 1: Subsurface Utility Investigation (SUI) Level 'A.'
 - 2. Stage 2: Submittals, Procurement, Mobilization.
 - 3. Stage 3: General Scope of Work.
- B. Sequencing of Construction Plan: Before start of construction, post electronic file to Project website of construction plan regarding phasing of Subsurface Utility Investigation Level 'A' and new Work for acceptance by Owner. After acceptance of plan, comply with accepted plan when coordinating construction sequencing unless deviations are accepted by Owner in writing.

1.6 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction (AHJ).
- B. On-Site Work Hours: Limit Work to between 6:00 a.m. to 8:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and AHJ.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions, and only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify Construction Manager not less than 5 work days in advance of proposed utility interruptions.
 - 2. Obtain Construction Manager's written permission before proceeding with utility interruptions.
- D. Smoking and Controlled Substance Restrictions: Use of alcoholic beverages, marijuana, and other controlled substances on Project Site and Owner's property is not permitted.

1.7 OWNER OCCUPANCY

- A. Owner will occupy Site premises during entire period of construction.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule Work to accommodate Owner occupancy.

1.8 PERMITS

- A. Furnish all necessary permits for construction of Work, including the following:
 - 1. Stormwater permit.
 - 2. Dewatering permit.
 - 3. Texas Department of Transportation Traffic Control Permit.

1.9 SPECIFICATION CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
- B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 20 00 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cash allowances.
 - 2. Schedule of Values.
 - 3. Application for Payment.
 - 4. Change procedures.
 - 5. Defect assessment.
 - 6. Unit prices.
 - 7. Alternates.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.

1.2 CASH ALLOWANCES

- A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts; delivery to Site and applicable taxes unless stated otherwise in Allowance Schedule.
- B. Costs Not Included in Cash Allowances but Included in Contract Sum/Price: Product handling at Site including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing unless stated otherwise in Allowance Schedule.
- C. Engineer Responsibilities:
 - 1. Consult with Contractor for consideration and selection of products and suppliers.
 - 2. Select products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- D. Contractor Responsibilities:
 - 1. Assist Engineer in selection of products and suppliers.
 - 2. Obtain proposals from suppliers and offer recommendations.
 - 3. Upon notification of selection by Engineer, execute purchase agreement with designated supplier.
 - 4. Arrange for and process Shop Drawings, Product Data, and Samples. Arrange for delivery.
 - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs will be adjusted by Change Order.

1.3 SCHEDULE OF VALUES

- A. Submit electronic file to Project website of schedule on Progress Estimate schedule on EJCDC C-620 Contractor's standard form or electronic media printout will be considered for this use.
- B. Submit Schedule of Values as electronic file to Project website within 15 days after date of Owner-Contractor Agreement.
- C. Format: Use Table of Contents of this Project Manual. Identify each line item with number and title of major Specification Section. Also identify Site mobilization.

- D. Include in each line item amount of allowances as specified in this Section. For unit cost allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- E. Include within each line item, direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders with each Application for Payment.

1.4 APPLICATION FOR PAYMENT

- A. Submit electronic file to Project website of each Application for Payment on EJCDC C-620 - Contractor's Application for Payment.
- B. Content and Format: Use Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit submittals with transmittal letter as specified in Section 01 33 00 "Submittal Procedures."
- F. Substantiating Data: When Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
 - 1. Current construction photographs specified in Section 01 33 00 "Submittal Procedures."
 - 2. Affidavits attesting to off-site stored products.
 - 3. Construction Progress Schedule, revised and current as specified in Section 01 33 00 "Submittal Procedures."

1.5 CHANGE PROCEDURES

- A. Submittals: Submit name of individual who is authorized to receive change documents and is responsible for informing others in Contractor's employ or subcontractors of changes to the Work.
- B. Carefully study and compare Contract Documents before proceeding with fabrication and installation of Work. Promptly advise Engineer of any error, inconsistency, omission, or apparent discrepancy.
- C. Requests for Interpretation (RFI) and Clarifications: Allot time in construction scheduling for liaison with Engineer; establish procedures for handling queries and clarifications.
 - 1. Use CSI Form 13.2A - Request for Interpretation for requesting interpretations.
 - 2. Engineer may respond with a direct answer on the Request for Interpretation form, Clarification Notice CSI Form 13.3A Clarification Notice, EJCDC C-942 - Field Order, or Proposal Request CSI Form 13/6A - Change Order Request (Proposal).
- D. Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions on EJCDC C-942.
- E. Engineer may issue CSI Form 13/6A Notice of Change including a detailed description of proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change. Contractor will prepare and submit estimate within 14 days.
- F. Contractor may propose changes by submitting a request for change to Engineer, describing proposed change and its full effect on the Work. Include a statement describing reason for the change and the effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on the Work by separate or other Contractors.
- G. Document requested substitutions according to Section 01 25 00 "Substitution Procedures."
- H. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Engineer.

- I. Unit Price Change Order: For Contract unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of that which are not predetermined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Force Account Change Order.
- J. Construction Change Directive: Architect/Engineer may issue directive, on EJCDC C-940 - Work Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- K. Force Account Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- L. Maintain detailed records of Work done on force account basis. Provide full information required for evaluation of proposed changes and to substantiate costs for changes in the Work.
- M. Document each quotation for change in Project Cost or Time with sufficient data to allow evaluation of quotation.
- N. Change Order Forms: EJCDC C-941 - Change Order.
- O. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- P. Correlation of Contractor Submittals:
 - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
 - 2. Promptly revise Progress Schedules to reflect change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
 - 3. Promptly enter changes in Record Documents.

1.6 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of Engineer, it is not practical to remove and replace the Work, Engineer will direct appropriate remedy or adjust payment.
- C. Individual Specification Sections may modify these options or may identify specific formula or percentage sum/price reduction.
- D. Authority of Engineer to assess defects and identify payment adjustments is final.
- E. Nonpayment for Rejected Products: Payment will not be made for rejected products for any of the following reasons:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from transporting vehicle.
 - 4. Products placed beyond lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected products.

1.7 UNIT PRICES

- A. Authority: Measurement methods are delineated in individual Specification Sections.
- B. Measurement methods delineated in individual Specification Sections complement criteria of this Section. In event of conflict, requirements of individual Specification Section govern.
- C. Take measurements and compute quantities. Engineer will verify measurements and quantities.
- D. Unit Quantities: Quantities and measurements indicated on Bid Form are for Contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment.
 - 1. When actual Work requires more or fewer quantities than those quantities indicated, provide required quantities at contracted unit sum/prices.
 - 2. When actual Work requires 25 percent or greater change in quantity than those quantities indicated, Owner or Contractor may claim a Contract Price adjustment.
- E. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.
- F. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit sum/price for Work incorporated in or made necessary by the Work.
- G. Measurement of Quantities:
 - 1. Weigh Scales: Inspected, tested, and certified by applicable State of Texas weights and measures department within past year.
 - 2. Platform Scales: Of sufficient size and capacity to accommodate conveying vehicle.
 - 3. Metering Devices: Inspected, tested, and certified by applicable State of Texas department within past year.
 - 4. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel, or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
 - 5. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.
 - 6. Measurement by Area: Measured by square dimension using mean length and width or radius.
 - 7. Linear Measurement: Measured by linear dimension, at item centerline or mean chord.
 - 8. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed item or unit of the Work.

1.8 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement. The Owner-Contractor Agreement may identify certain Alternates to remain an Owner option for a stipulated period of time.

- B. Coordinate related Work and modify surrounding Work. Description for each Alternate is recognized to be abbreviated but requires that each change shall be complete for scope of Work affected.
 - 1. Coordinate related requirements among Specification Sections as required.
 - 2. Include as part of each Alternate: Miscellaneous devices, appurtenances, and similar items incidental to or necessary for complete installation.
 - 3. Coordinate Alternate with adjacent Work and modify or adjust as necessary to ensure integration.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 22 00 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Procedures for measurement and payment.
 - 2. Mobilization demobilization.
 - 3. Unit price items.
 - 4. Lump sum items.
 - 5. Bid Form-specific payment items.
- B. Related Requirements:
 - 1. Section 00 41 00 "Bid Form."
 - 2. Other Division 01 Specification Sections apply to Work of the Section.

1.2 PROCEDURES FOR MEASUREMENT AND PAYMENT

- A. Unit price bid on each item as stated in Section 00 41 00 "Bid Form" includes furnishing all labor, superintendence, machinery, equipment, and materials, except as otherwise specified, necessary, or incidental to complete various item of Work per Drawings and Specifications.
- B. Cost of Work or materials shown on Drawings or called for in Specifications and on which no separate payment is made, included in bid prices on various pay items.
- C. Payment not made for any items not complete, including all associated incidental Work.

1.3 MOBILIZATION/DEMOBILIZATION

- A. Payment made for mobilization and demobilization on lump sum basis.
- B. Bid amount for mobilization and demobilization shall not exceed 5 percent of total Bid Price.
- C. Work under this item consists of preparatory work and operations, including but not limited to those necessary for movement of personnel, equipment, supplies, and incidentals to Work; establish all offices, buildings, and other facilities necessary for Work; and all other work and operations performed or costs incurred prior to beginning work on various items of Work.
- D. Payment for mobilization and demobilization will be on a lump sum basis with partial payments as noted. The adjusted Contract Amount as used herein is defined as the total Contract amount less lump sum for mobilization and demobilization.
 - 1. First Application for Payment: 50 percent of lump sum.
 - 2. Second Application for Payment: 75 percent of the lump sum.
 - 3. When 10 percent of adjusted Contract amount is earned, 90 percent of mobilization and demobilization lump sum.
 - 4. Final Application for Payment: 100 percent of mobilization and demobilization lump sum.

1.4 UNIT PRICE ITEMS

- A. Unit price items, not otherwise included herein, paid at a unit price per unit.
- B. Payment will include all work and material for installing unit price item as specified.

- C. Measurement made in units shown on Section 00 41 00 "Bid Form."

1.5 LUMP SUM ITEMS

- A. Lump sum items include all work and materials for installing lump sum item as specified.
- B. Payment based on percentage complete basis as agreed by Engineer and Contractor.
- C. Payment includes all work and material for installing lump sum bid item as specified.

1.6 BID FORM-SPECIFIC PAYMENT ITEMS

A. General

- 1. Mobilization / Demobilization (Max 5 percent of Project Total):
 - a. Measurement: Lump Sum.
 - b. Payment: Lump sum basis for bonds, insurance, mobilizing and demobilizing. Mobilization will be limited to 3 percent of total Base Bid (60 percent of Mobilization / Demobilization Lump Sum item bid amount). Demobilization will be limited to 2 percent of total Base Bid (40 percent of Mobilization / Demobilization Lump Sum item bid amount). Owner shall be solely responsible to determine timing for demobilization payment.
- 2. Level 'A' Subsurface Utility Investigation (SUI):
 - a. Measurement: Lump Sum.
 - b. Payment: Lump sum basis for contacting 'One Call' locate entities and utility contacts, locating, uncovering, and surveying horizontal location and vertical elevation pro-rated prior to mobilizing and ordering materials for construction. This work will be used to allow for any required modifications to design based on actuals versus best known information in design. Payment is pro-rated based on utilities located versus utilities identified and area of coverage.
- 3. Groundwater Dewatering:
 - a. Measurement: Calendar Day.
 - b. Payment: Calendar Day basis for each calendar day that groundwater dewatering is required in order to complete construction of Project per specifications.
- 4. Trench Safety (Water and Wastewater):
 - a. Measurement: Linear Foot.
 - b. Payment: Per linear foot of trench excavated for water and wastewater utility installation. Includes all equipment, material, labor, excavation, backfill sloping, shoring, support and protection required per specifications, OSHA and other safety regulations.
- 5. Warning Tape and Tracer Wire (Water and Wastewater):
 - a. Measurement: Linear Foot.
 - b. Payment: Per linear foot of warning tape and tracer wire supplied and installed complete in backfilled trench in accordance with Specifications; Drawings; City of Midland, TCEQ and Texas Department of Transportation standards; inclusive of all labor materials, equipment and appurtenances for a complete installation.
- 6. Traffic Control:
 - a. Measurement: Lump Sum.

- b. Payment: Pro-rated based on completion of Work in total area requiring traffic control as defined in the Traffic Control Plan submitted by the Contractor and permitted by the Texas Department of Transportation. Inclusive of all materials, labor, equipment and appurtenances required to prepare, implement and maintain.
7. Stormwater Pollution Prevention Plan and Erosion Control:
 - a. Measurement: Lump Sum.
 - b. Payment: Pro-rated based on percentage of project completed monthly for all equipment, materials, parts, labor and appurtenances required for preparing SWPPP, Filing Notices(s) of Intent (NOI), installing and maintaining erosion control measures, preparing reports, and filing a Notice of Termination (NOT) as specified.
8. Asphalt Paving Cut Edge, Remove and Replace:
 - a. Measurement: Square yard basis of measured finished area based on defined limits as specified on Drawings.
 - b. Payment: Per square yard for labor, equipment, material and appurtenances required for cutting, removing, disposing, and repairing pavement and other incidental work. No payment for work outside maximum payment limits indicated on Drawings or pavement removed for Contractor convenience.
9. Concrete Paving Remove and Replacement:
 - a. Measurement: Square yard basis of measured finished area based on defined limits as specified on Drawings.
 - b. Payment: Per square yard for labor, equipment, material and appurtenances required for cutting, removing, disposing, and repairing pavement and other incidental work. No payment for work outside maximum payment limits indicated on Drawings or pavement removed for Contractor convenience.
10. Gravel Paving Removal and Replacement:
 - a. Measurement: Square yard basis of measured finished area based on defined limits as specified on Drawings.
 - b. Payment: Per square yard for labor, equipment, material and appurtenances required for cutting, removing, disposing, and repairing pavement and other incidental work. Gravel paving shall match the material in place and be up to 6 inches in depth. No payment for work outside maximum payment limits indicated on Drawings or pavement removed for Contractor convenience.
11. Rip Rap Removal and Replacement:
 - a. Measurement: Square yard basis of measured finished area based on defined limits as specified on Drawings.
 - b. Payment: Per square yard for labor, equipment, material and appurtenances required for cutting, removing, disposing, and repairing rip rap in kind, geotextile fabric, membrane liner and other incidental work. No payment for work outside maximum payment limits indicated on Drawings or pavement removed for Contractor convenience.
12. Remove and Reinstall or Replace Mail Box:
 - a. Measurement: Each.
 - b. Payment: Per each coordinating with United States Postal Service and Mail Box Owner, removing, providing temporary delivery accommodation and replacement or reinstallation after completion of Work in area of Mail Box. Inclusive of all labor, materials, equipment, appurtenances and accommodations required.
13. Remove and Reinstall or Replace Roadway Sign:
 - a. Measurement: Each.

- b. Payment: Per each unit price for coordinating with Texas Department of Transportation and / or Authority Having Jurisdiction to temporarily remove or relocate sign during Work and replacing or reinstalling at completion of Work in area of sign. Inclusive of all labor, materials, equipment, appurtenances and accommodations required.
- 14. Remove and Replace Driveway Culvert Pipe:
 - a. Measurement: Linear Foot.
 - b. Payment: Per linear foot of driveway culvert pipe removed during construction and replaced with new steel pipe grading ditches to daylight and backfilling and covering complete in place size to match pipe removed.
- 15. Remove and Reinstall or Replace Chain Link Fence:
 - a. Measurement: Linear foot basis as measured along the ground of installed fence without any deduction for gates or posts.
 - b. Payment: For each type and height matching existing per linear foot removed, reinstalled, furnished and installed if required for installation of water and wastewater lines.
- 16. Remove and Replace Fence:
 - a. Measurement: Linear foot basis as measured along the ground of removed and replaced fence without deductions for gates or posts.
 - b. Payment: For each type and height specified, shown on Drawings, and included in Bid Form, payment per linear foot for removal and replacement.
- 17. Re-stripe Parking Lot:
 - a. Measurement: Lump Sum.
 - b. Payment: Per Lump Sum for re-striping.
- B. Water
 - 1. Water Lines:
 - a. Measurement: Linear foot basis as measured along center line of installed pipe, measured center-of-fitting to center-of-fitting or end-of-pipe without any deduction for length of intermediate fittings or valves.
 - b. Payment: For each type and size specified, shown on Drawings and included in Bid Form, payment per unit price for furnishing and installing at depths shown.
 - 2. Casing in Bore:
 - a. Measurement: Linear foot basis as measured along center line of casing installed, measured from end-to-end of casing.
 - b. Payment: For each type and size specified, shown on Drawings, and included in Bid Form, payment per unit price for furnishing and installing at depths shown.
 - c. Payment Includes: Excavation and backfill, welding, spacers, bore pits, and other incidental work required for complete installation.
 - 3. Ductile Iron Fittings:
 - a. Measurement: Per ton of fittings supplied. Fitting weights are sum of various types of fittings multiplied by weight per fitting as listed in AWWA/ANSI CL153/A21.53.
 - b. Payment: Per ton of fittings installed.
 - 4. Gate Valves and Boxes:
 - a. Measurement: Per each basis as installed.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each for furnishing and installing. Complete in place, to include excavation, valve, valve box, concrete pad, accessories, bedding, backfill, equipment, and incidentals

5. Blow-Off and Combination Air Valves:
 - a. Measurement: Per each basis as installed.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each. Complete in place, to include excavation, valve, valve vault, concrete pad, accessories, bedding, backfill, equipment, and incidentals.
 6. Abandon, Cut, and Plug Existing Line:
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each.
 7. Connection:
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each.
 8. Tapping Sleeves:
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each.
 9. Fire Hydrants:
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each. Complete in place, to include excavation, hydrant, isolation valve and box, concrete pads, accessories, foundation bedding, backfill, equipment, and incidentals.
 10. 6-Inch Domestic Compound Water Meter Vault & Assembly:
 - a. Measurement: Lump Sum.
 - b. Payment: Lump sum for design, precast fabrication, installation of pipe, fittings, meters and appurtenances, shipped, delivered, stored, excavation, foundation, coating of subgrade surfaces on outside of vaule with bituminous coating, setting, backfill,connect piping and installed per Drawings and specifications. Includes all labor, material, equipment for a complete operational installation.
 11. Bollard:
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size specified on Drawings and included in Bid Form, payment per each.
- C. Wastewater
1. Manholes (0-6 feet):
 - a. Measurement: Per each basis.
 - b. Payment: For each type and size as specified, shown on Drawings, and included in Bid Form, payment per each.
 2. Extra Depth Manhole (depth >6 feet):
 - a. Measurement: Per vertical foot basis measured in excess of 6-foot depth.
 - b. Payment: For each type and size as specified, shown on Drawings, and included in Bid Form, payment per vertical foot.
 3. Tie to Existing Manhole:
 - a. Measurement: Per each basis measured as number of connections made to existing manholes.
 - b. Payment: For each type and size as specified, shown on Drawings, and included in Bid Form, payment per each.
 4. Sewer Stubout with Plug:

- a. Measurement: Per each basis.
 - b. Payment: For each type and size as specified, shown in Drawings, and included in Bid Form, payment per each.
5. Sewer Service Connections:
- a. Measurement: Per each basis.
 - b. Payment: For each type and size as specified, shown in Drawings, and included in Bid Form, payment per each.
6. Gravity Sanitary Sewer Pipe:
- a. Measurement: Per linear foot basis as measured along surface from center-to-center of manholes or appurtenances.
 - b. Payment: For each type, size, and depth as specified, shown in Drawings, and included in Bid Form, payment per linear foot.
7. Cleanout:
- a. Measurement: Per each basis.
 - b. Payment: For each type and size as specified, shown in Drawings, and included in Bid Form, payment per each.
8. Plug and Abandon Existing Line:
- a. Measurement: Per each basis.
 - b. Payment: For each type and size as specified, shown in Drawings, and included in Bid Form, payment per each.
 - c. Measurement: Per each basis.
 - d. Payment: For each type and size as specified, shown in Drawings, and included in Bid Form, payment per each. Inclusive of all labor, work, material, equipment and appurtenances necessary to complete as specified.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Quality assurance.
 - 2. Product options.
 - 3. Product substitution procedures.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.

1.2 QUALITY ASSURANCE

- A. Contract is based on products and standards established in Contract Documents without consideration of proposed substitutions.
- B. Products specified define standard of quality, type, function, dimension, appearance, and performance required.
- C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless Owner accepts substitution and approves in writing.

1.3 PRODUCT OPTIONS

- A. See Section 01 60 00 "Product Requirements."

1.4 PRODUCT SUBSTITUTION PROCEDURES

- A. Engineer will consider requests for substitutions only within 30 days after date established in Notice to Proceed.
- B. Substitutions may be considered when product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents, including:
 - 1. Manufacturer name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
 - 2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
 - 3. Reference to Article numbers in Specifications.
 - 4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
 - 5. Changes required in other Work.
 - 6. Availability of maintenance service and source of replacement parts, as applicable.
 - 7. Certified test data to show compliance with performance characteristics specified.
 - 8. Samples when applicable or requested.
 - 9. Other information as necessary to assist Engineer's evaluation.

- D. A request constitutes a representation Contractor:
 - 1. Investigated proposed product and determined it meets/exceeds quality level of specified product.
 - 2. Will provide same warranty for substitution as specified product.
 - 3. Will coordinate installation and make changes to other Work required for Work to complete with no additional cost to Owner.
 - 4. Waives claims for additional costs/time extension that subsequently become apparent.
 - 5. Will coordinate installation of accepted substitute, making required changes for Work to complete in all respects.
 - 6. Will reimburse Owner for review/redesign services associated with reapproval by authorities having jurisdiction.
- E. Substitutions not considered when indicated/implied on Shop Drawing or Product Data submittals without separate written request or acceptance requires revision to Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit requests for substitutions on Contractor-standard or Engineer-provided form.
 - 2. Submit electronic files to Project website of Request for Substitution for consideration. Limit each request to one proposed substitution.
 - 3. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on Contractor.
 - 4. Engineer will notify Contractor in writing of decision to accept/reject request.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 30 00 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coordination and Project conditions.
 - 2. Preconstruction meeting.
 - 3. Site mobilization meeting.
 - 4. Progress meetings.
 - 5. Preinstallation meetings.
 - 6. Alteration procedures.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - 1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.
- D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and subcontractors to ensure coordination of Work.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion.
- G. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

- A. Engineer will schedule and preside over meeting after Notice of Award.
- B. Attendance Required: Engineer, Owner, Resident Project Representative, Construction Manager, major subcontractors, and Contractor.

- C. Minimum Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Submission of list of subcontractors, list of products, schedule of values, submittal schedule and Progress Schedule.
 - 3. Designation of personnel representing parties in Contract, Project manager, superintendent, inspector, and Engineer.
 - 4. Communication procedures.
 - 5. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
 - 6. Scheduling.
 - 7. Critical Work sequencing.
- D. Construction Manager: Record minutes and distribute to participants within seven days after meeting, with electronic copies each, to Engineer, Owner, and those affected by decisions made.

1.4 SITE MOBILIZATION MEETING

- A. Engineer will schedule meeting at Project Site prior to Contractor occupancy. Construction Manager presides over meeting.
- B. Attendance Required: Engineer, Owner, Contractor, Contractor's superintendent, Construction Manager, major Subcontractors.
- C. Minimum Agenda:
 - 1. Use of premises by Owner and Contractor.
 - 2. Owner's requirements and occupancy.
 - 3. Construction facilities and controls provided by Owner.
 - 4. Temporary utilities.
 - 5. Survey and pipeline layout.
 - 6. Security and housekeeping procedures.
 - 7. Schedules.
 - 8. Procedures for testing.
 - 9. Procedures for maintaining record documents.
 - 10. Inspection and acceptance of systems put into service during construction period.
- D. Construction Manager: Record minutes and distribute to participants within seven days after meeting, with electronic copies each, to Owner, and those affected by decisions made.

1.5 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, and preside over meetings.
- C. Attendance Required: Job superintendent, major Contractors and suppliers, and Engineer, Owner, as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems impeding planned progress.
 - 5. Review of submittal 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. Other business relating to Work.
- E. Construction Manager: Record minutes and distribute to participants within seven days after meeting, with electronic copies each, to Engineer, Owner, and those affected by decisions made.

1.6 PREINSTALLATION MEETINGS

- A. When required in individual Specification Sections, convene preinstallation meetings at Project Site before starting Work of specific Section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific Section.
- C. Notify Engineer 7 days in advance of meeting date.
- D. Prepare agenda and preside over meeting:
 1. Review conditions of installation, preparation, and installation procedures.
 2. Review coordination with related Work.
- E. Record minutes and distribute to participants within 7 days after meeting, with electronic copies each, to Engineer, Owner, and those affected by decisions made.

1.7 CLOSEOUT MEETING

- A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: Contractor, Construction Manager, major Contractors, major subcontractors, Engineer, Owner, and others appropriate to agenda.
- C. Notify Engineer 7 days in advance of meeting date.
- D. Minimum Agenda:
 1. Start-up of facilities and systems.
 2. Operations and maintenance manuals.
 3. Testing, adjusting, and balancing.
 4. System demonstration and observation.
 5. Operation and maintenance instructions for Owner's personnel.
 6. Contractor's inspection of Work.
 7. Contractor's preparation of an initial "punch list."
 8. Procedure to request Engineer inspection to determine date of Substantial Completion.
 9. Completion time for correcting deficiencies.
 10. Inspections by authorities having jurisdiction.
 11. Partial release of retainage.
 12. Final cleaning.
 13. Preparation for final inspection.
 14. Closeout Submittals:
 - a. Project record documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Affidavits.

15. Final Application for Payment.
 16. Contractor's demobilization of Site.
 17. Maintenance.
- E. Record minutes and distribute to participants within 7 days after meeting, with electronic copies each, to Engineer, Owner, and those affected by decisions made.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

RFI
No. _____

TO: Parkhill

FROM:

SUBMITTED BY:

PROJECT NAME:

PARKHILL PROJECT NO.:

* Items to be completed by Contractor before submittal to Parkhill for review. RFI form must be fully completed for Parkhill to respond.

Issue Date:		*Requested Reply Date:	
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* **RFI DESCRIPTION:** (Fully describe the question or type of information requested. Provide photos and/or sketches as applicable to help with the description. Additional pages may be attached, if needed.)

* **REFERENCES/ATTACHMENTS:** (List specific documents researched when seeking the information requested.)

Specifications	Drawings	Other

* *Disciplines involved (select one or more):*

- Architect Civil Landscape Architect Interior Designer Structural Mechanical Plumbing
 Electrical List Other _____

* **CONTRACTOR'S PROPOSED SOLUTION:** (If RFI concerns a site or construction condition, the sender shall provide a recommended solution, including cost and/or schedule considerations before Parkhill can respond. The proposal solution shall consist of a revised text, sketches, drawings, etc. as applicable to a full and complete explanation.)

RESPONSE: (Provide answer to RFI, including cost and/or schedule considerations, revised text, sketches, drawings, etc. as applicable to fully explain response. Additional pages may be attached, if needed.)

Response by: _____

Attachments:

Copies: Owner Consultants

Note: This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Construction Change Request must be executed in accordance with the Contract Documents.

 **AIA[®] Document C106™ – 2022****Digital Data Licensing Agreement**

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

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address, and contact information, including electronic addresses)

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address, and contact information, including electronic addresses)

for the following Project:
(Name and location or address of the Project)

for the following Digital Data ("Digital Data"):
(Identify below, in detail, the information created or stored in digital form that the Parties intend to be subject to this Agreement.)

[Revit Models (.rvt files)]
[AutoCAD (.dwg files)]
[Portable Document Format (.pdf)]

The Transmitting Party and Receiving Party agree as follows.

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

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

TABLE OF ARTICLES

1	GENERAL PROVISIONS
2	TRANSMISSION OF DIGITAL DATA
3	LICENSE CONDITIONS
4	LICENSING FEE OR OTHER COMPENSATION

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the Parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the Parties.

§ 1.3 Confidential Digital Data is Digital Data containing confidential or business proprietary information that the Transmitting Party designates as "confidential."

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data solely and exclusively for the uses, and in accordance with the terms, set forth in Article 3.

§ 2.2 Only the Receiving Party is permitted to access and use the Digital Data. Unlicensed and unauthorized access or use by third parties is strictly prohibited except as set forth in Section 2.4.1.

§ 2.3 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.4 Where the Transmitting Party has designated information furnished pursuant to this Agreement as "confidential," the Receiving Party shall keep the information confidential and shall not disclose it to any other person or entity except as set forth in Section 2.4.1.

§ 2.4.1 The Receiving Party may disclose Confidential Digital Data after seven (7) days' notice to the Transmitting Party where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Receiving Party may also disclose Confidential Digital Data to its employees, consultants, sureties, subcontractors and their employees, sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.5 By transmitting Digital Data, the Transmitting Party does not convey any ownership right in the Digital Data or in the software used to generate the Digital Data. Unless otherwise granted in a separate license, the Receiving Party's right to use, modify, or further transmit Digital Data is specifically limited to those uses, and in accordance with the terms, set forth in Article 3, and nothing contained in this Agreement conveys any other right to use the Digital Data.

§ 2.6 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

§ 2.7 Transmission of the Digital Data does not abridge or extinguish the Transmitting Party's rights, including, to the extent applicable, exclusive ownership interest, in such information under all applicable state, federal, and international laws including, without limitation, laws governing the protection of copyrights and intellectual property.

§ 2.8 The provisions of this Article 2 shall survive the termination of this Agreement.

ARTICLE 3 LICENSE CONDITIONS

§ 3.1 The Receiving Party may use and rely upon the Digital Data to the extent set forth in this Article 3.

(Paragraph deleted)

[X] § 3.1.1 The Digital Data is transmitted solely for the Receiving Party's information. Receiving Party acknowledges that any use of the Digital Data shall be at Receiving Party's sole risk. The Receiving Party accepts the Digital Data "as is" without any warranty or representations from the Transmitting Party as to whether the Digital Data is accurate, complete, or fit for use as intended by the Receiving Party. The Receiving Party is solely responsible for verifying whether the Digital Data is accurate, complete, or fit for the Receiving Party's intended use.

(Paragraphs deleted)

§ 3.1.1.1 This Digital Data is part of the Transmitting Party's Instruments of Service and shall not be used by Receiving Party or anyone else receiving this data through or from the Receiving Party for any purpose other than as a convenience in the preparation of bid submittals, shop drawings, coordination drawings, construction phase submittals, and field layout and staking required by the Owner for the exclusive use of the referenced Project. Any use or reuse by the Receiving Party or by others will be at the Receiving Party's sole risk and without liability or legal exposure to Transmitting Party. The Receiving Party agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against Transmitting Party, its officers, directors, employees, or subconsultants that may arise out of or in connection with Receiving Party's use of this Digital Data.

§ 3.1.1.2 No representation as to the compatibility of this Digital Data with Receiving Party's hardware or software is provided.

§ 3.1.1.3 This Digital Data is not a Construction Document. Differences may exist between this Digital Data and corresponding two-dimensional hard-copy Construction Document. The Transmitting Party makes no representation regarding the accuracy or completeness of the Digital Data the Receiving Party receives. In the event that a conflict arises between the signed/sealed two-dimensional hard-copy Construction Document prepared by Transmitting Party and the Digital Data, the signed/sealed two-dimensional hard-copy Construction Document shall govern. The Receiving Party is responsible for determining if any conflict exists. By the Receiving Party's use of this Digital Data, Receiving Party is not relieved of their duty to fully comply with the Contract Documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, field measurements, verify field conditions and coordination of work with that of other contractors for the Project.

§ 3.1.1.4 Because information presented in the Digital Data can be modified, unintentionally or otherwise, the Transmitting Party reserves the right to remove all indicia of ownership and/or involvement from each Digital Data.

§ 3.1.1.5 Under no circumstances shall delivery of this Digital Data for use by the Receiving Party be deemed a sale of document ownership by Transmitting Party, and no warranties, either express or implied, of merchantability or fitness for any particular purpose is made. In no event shall the Transmitting Party be liable for any loss of profit or any consequential damages as a result of the Receiving Party's use or reuse of this Digital Data.

§ 3.1.1.6 The Digital Data file does not necessarily contain all the information that is required to produce finished Construction Documents. Because of this, there may be data within the Digital Data that is missing, incomplete or even contradictory to the information provided in the final two dimensional Construction Documents.

§ 3.1.1.7 Professional judgment will need to be used by the Receiving Party, along with reasonable expectations and interpretations in order to use the Digital Data for its intended purpose. Should the Transmitting Party provide revised and updated copies of the Digital Data to the Receiving Party throughout the Project, all terms and conditions of this agreement will be applicable and unchanged for all subsequent transmissions of the Digital Data

Init.

ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation for the Receiving Party's use of the Digital Data:

(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

This Agreement is entered into as of the day and year first written above and terminates one year from said date, except as set forth below.

(Indicate when this Agreement will terminate, if other than one year from the date it was entered into, and other conditions related to termination.)

N/A

PARKHILL

[RECEIVING PARTY]

TRANSMITTING PARTY *(Signature)*

RECEIVING PARTY *(Signature)*

(Printed name and title)

(Printed name and title)

SECTION 01 32 16 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Web-based project management software package.
 - 2. Digital Project data licensing.
 - 3. Submittals.
 - 4. Quality assurance.
 - 5. Format for network analysis schedules.
 - 6. Network analysis schedules.
 - 7. Bar chart schedules.
 - 8. Review and evaluation.
 - 9. Updating schedules.
 - 10. Distribution.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.

1.2 WEB-BASED PROJECT MANAGEMENT SOFTWARE PACKAGE

- A. Web-Based Project Management Software Package: Use Engineer's web-based Project management software package for purposes of hosting and managing Project communication and documentation until final completion.
 - 1. Web-based Project management software includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Engineer, Engineer's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow among Project entities.
 - d. Create, log, track, and notify Project members of Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, minor changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Process and track Payment Applications.
 - h. Process and track contract modifications.
 - i. Create and distribute meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.

- B. Provide up to seven Project management software user licenses for use by Owner, Construction Manager, Engineer, and Engineer's consultants. Provide eight hours of software training at Engineer's office for web-based Project software users.
 - 1. At completion of Project, provide digital archive in format that is readable by common desktop software applications and acceptable to Engineer. Provide data in locked format to prevent further changes.
 - 2. Manufacturers:
 - a. Newforma, Inc.
 - 3. Products: Provide one of the above Project management software packages under the current published licensing agreements.

1.3 DIGITAL PROJECT DATA LICENSING

- A. Engineer's Data Files Not Available: Engineer will not provide Engineer's CAD drawing digital data files for Contractor's use during construction.

1.4 SUBMITTALS

- A. Within 10 days after date established in Notice to Proceed, submit proposed preliminary network diagram defining planned operations for first 60 days of Work, with general outline for remainder of Work.
- B. Participate in review of preliminary and complete network diagrams jointly with Engineer.
- C. Within 20 days after joint review of proposed preliminary network diagram, submit draft of proposed complete network diagram for review. Include written certification that major Subcontractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete network analysis consisting of network diagrams and mathematical analyses.
- E. Submit updated network schedules with each Application for Payment and at least every 30 days.
- F. Post as electronic file to Project website.
- G. Schedule Updates:
 - 1. Overall percent complete, projected and actual.
 - 2. Completion progress by listed activity and sub-activity, to within five working days prior to submittal.
 - 3. Changes in Work scope and activities modified since submittal.
 - 4. Delays in submittals or resubmittals, deliveries, or Work.
 - 5. Adjusted or modified sequences of Work.
 - 6. Other identifiable changes.
 - 7. Revised projections of progress and completion.
- H. Narrative Progress Report:
 - 1. Submit with each monthly submission of Progress Schedule.
 - 2. Summary of Work completed during the past period between reports.
 - 3. Work planned during the next period.
 - 4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
 - 5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
 - 6. Corrective action taken or proposed.

1.5 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel specializing in scheduling with 2 years' minimum experience in scheduling construction work of complexity comparable to the Project, and having use of computer facilities capable of delivering detailed graphic printout within 48 hours of request.
- B. Contractor's Administrative Personnel: Two years' minimum experience in using and monitoring schedules on comparable Projects.

1.6 NETWORK ANALYSIS SCHEDULES

- A. Bar Chart Schedules
 - 1. Format: Bar chart Schedule, to include at least:
 - a. Identification and listing in chronological order of those activities reasonably required to complete the Work, including:
 - 1) Subcontract Work.
 - 2) Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
 - 3) Move-in and other preliminary activities.
 - 4) Equipment and equipment system test and startup activities.
 - 5) Project closeout and cleanup.
 - 6) Work sequences, constraints, and milestones.
 - b. Listings identified by Specification Section number.
 - c. Identification of the following:
 - 1) Horizontal time frame by year, month, and week.
 - 2) Duration, early start, and completion for each activity and subactivity.
 - 3) Critical activities and Project float.
 - 4) Subschedules to further define critical portions of Work.

1.7 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of schedules with Engineer at each submittal.
- B. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.
- C. After review, revise schedules incorporating results of review, and resubmit within 10 days.

1.8 UPDATING SCHEDULES

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update schedules to depict current status of Work.
- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Upon approval of a Change Order, include the change in the next schedule submittal.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit sorts as required to support recommended changes.
- G. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect.

1.9 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's Project site file, Subcontractors, suppliers, Engineer, Owner , and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Concealed Work photographs.
 - 3. Periodic construction photographs.
 - 4. Time-lapse sequence construction photographs.
 - 5. Final Completion construction photographs.
 - 6. Preconstruction video recordings.
 - 7. Periodic construction video recordings.
 - 8. Time-lapse sequence construction video recordings.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.
 - 2. Retain subparagraphs below to cross-reference requirements. Contractor might expect to find in this Section but are specified in other Sections.
 - 3. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
 - 4. Section 31 10 00 "Site Clearing" for photographic documentation before site clearing operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in web-based Project management software site:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Engineer and Construction Manager.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
- B. Video Recordings: Submit video recordings within 7 days of recording.
 - 1. Submit video recordings by uploading to web-based Project management software site. Include copy of key plan indicating each video's location and direction.
 - 2. Identification: With each submittal, provide the following information on web-based Project management software site:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Contractor.
 - d. Date video recording was recorded.
 - e. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

1.3 FORMATS AND MEDIA

- A. Metadata: Record accurate date and time and GPS location data from camera.
- B. File Names: Name media files with date Project area and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.
 - 1. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- B. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
 - 1. Underground utilities.
 - 2. Piping.
 - 3. Electrical conduit.
 - 4. Waterproofing and weather-resistant barriers.
- C. Periodic Construction Photographs: Take 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Final Completion Construction Photographs: Take 100 photographs after date of Substantial Completion for submission as Project Record Documents. Construction Manager will inform photographer of desired vantage points.

1.5 CONSTRUCTION VIDEO RECORDINGS

- A. Preconstruction Video Recording: Before starting excavation demolition construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Construction Manager.
 - 1. Flag construction limits before recording construction video recordings.
 - 2. Show existing conditions adjacent to Project site before starting the Work.
 - 3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of excavation demolition construction.
 - 4. Show protection efforts by Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Definitions.
 - 2. Submittal procedures.
 - 3. Construction progress schedules.
 - 4. Proposed product list.
 - 5. Product data.
 - 6. Use of electronic CAD files of Project Drawings.
 - 7. Shop Drawings.
 - 8. Samples.
 - 9. Design data.
 - 10. Test reports.
 - 11. Certificates.
 - 12. Manufacturer's instructions.
 - 13. Manufacturer's field reports.
 - 14. Erection Drawings.
 - 15. Construction photographs.
 - 16. Contractor review.
 - 17. Architect/Engineer review.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 32 16 "Construction Progress Schedule."
 - 3. Section 01 70 00 "Execution and Closeout Requirements."

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's and Construction Manager's responsive action.
- B. Informational Submittals: Written and graphic information and physical Samples that do not require Engineer's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with CSI Form 12.1A - Submittal Transmittal or Engineer-accepted form.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and post electronic submittals as PDF electronic files to Project website. Coordinate submission of related items.

- F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor.
- G. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized nor processed.
- L. Incomplete Submittals: Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Comply with Section 01 32 16 "Construction Progress Schedule."

1.5 PROPOSED PRODUCT LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

- A. Product Data: Action Submittal: Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Post electronic submittals as PDF electronic files to Project website.
- C. Submit electronic submittals via email as PDF electronic files.
- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- F. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 "Execution and Closeout Requirements."

1.7 ELECTRONIC CAD FILES OF PROJECT DRAWINGS

- A. Electronic CAD Files of Project Drawings: May only be used to expedite production of Shop Drawings for the Project. Use for other Projects or purposes is not allowed.
- B. Electronic CAD Files of Project Drawings: Distributed only under the following conditions:
 - 1. Use of files is solely at receiver's risk. Engineer does not warrant accuracy of files. Receiving files in electronic form does not relieve receiver of responsibilities for measurements, dimensions, and quantities set forth in Contract Documents. In the event of ambiguity, discrepancy, or conflict between information on electronic media and that in Contract Documents, notify Engineer of discrepancy and use information in hard-copy Drawings and Specifications.

2. CAD files do not necessarily represent the latest Contract Documents, existing conditions, and as-built conditions. Receiver is responsible for determining and complying with these conditions and for incorporating addenda and modifications.
 3. User is responsible for removing information not normally provided on Shop Drawings and removing references to Contract Documents. Shop Drawings submitted with information associated with other trades or with references to Contract Documents will not be reviewed and will be immediately returned.
 4. Receiver shall not hold Engineer responsible for data or file clean-up required to make files usable, nor for error or malfunction in translation, interpretation, or use of this electronic information.
 5. Receiver shall understand that even though Engineer has computer virus scanning software to detect presence of computer viruses, there is no guarantee that computer viruses are not present in files or in electronic media.
 6. Receiver shall not hold Engineer responsible for such viruses or their consequences, and shall hold Engineer harmless against costs, losses, or damage caused by presence of computer virus in files or media.
- C. Costs: \$100 per file, plus \$0.825 sales tax, per request, paid in advance by certified check or money order payable to Engineer.

1.8 SHOP DRAWINGS

- A. Action Submittal: Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
 1. Include signed and sealed calculations to support design.
 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Post electronic submittals as PDF electronic files to Project website.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 "Execution and Closeout Requirements."

1.9 SAMPLES

- A. Samples: Action Submittal: Submit to Architect/Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
 1. Submit to Engineer for aesthetic, color, and finish selection.
 2. Submit Samples of finishes, textures, and patterns for Engineer selection.
- C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
- D. Include identification on each Sample, with full Project information.
- E. Submit number of Samples specified in individual Specification Sections; Architect/Engineer will retain one Sample.
- F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.

- G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
- H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 01 70 00 "Execution and Closeout Requirements."

1.10 OTHER SUBMITTALS

- A. Closeout Submittals: Comply with Section 01 70 00 "Execution and Closeout Requirements."
- B. Informational Submittal: Submit data for Engineer's knowledge as Contract administrator or for Owner.
- C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 TEST REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 CERTIFICATES

- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.13 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Engineer's knowledge as Contract administrator or for Owner.
- B. Submit report within 5 days of observation to Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.15 ERECTION DRAWINGS

- A. Informational Submittal: Submit Drawings for Engineer's knowledge as Contract administrator or for Owner.

- B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.16 CONSTRUCTION PHOTOGRAPHS

- A. Provide photographs of Site and construction throughout progress of Work produced by an experienced photographer acceptable to Engineer.
- B. Submit photographs and video of pre-construction conditions prior to mobilizing on site. Payment applications will not be considered complete without pre-construction conditions.
- C. Each month submit photographs with Application for Payment.
- D. Digital Images: Deliver complete set of digital image electronic files posted to project website and on CD-ROM to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.
 - 1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1,600 by 1,200 pixels.
 - 2. Date and Time: Include date and time in filename for each image.

1.17 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Engineer and Construction Manager.
- B. Contractor: Responsible for:
 - 1. Determination and verification of materials including manufacturer's catalog numbers.
 - 2. Determination and verification of field measurements and field construction criteria.
 - 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 - 4. Determination of accuracy and completeness of dimensions and quantities.
 - 5. Confirmation and coordination of dimensions and field conditions at Site.
 - 6. Construction means, techniques, sequences, and procedures.
 - 7. Safety precautions.
 - 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Engineer.

1.18 ENGINEER REVIEW

- A. Do not make "mass submittals" to Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Engineer's review time stated above will be extended as necessary to perform proper review. Engineer will review "mass submittals" based on priority determined by Engineer after consultation with Owner and Construction Manager.
- B. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.

- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order, Field Order, or Construction Change Directive.
- E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Quality control.
 - 2. Tolerances.
 - 3. References.
 - 4. Labeling.
 - 5. Testing and inspection services.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 33 00 "Submittal Procedures," for requirements for manufacturer's field reports.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Perform Work using persons qualified to produce required and specified quality.
- D. Products, materials, and equipment may be subject to inspection by Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.
- E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date for receiving Bids except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.

- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 TESTING AND INSPECTION SERVICES

- A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.
 - 1. Before starting Work, submit testing laboratory name, address, and telephone number, and names of full-time Professional Engineer and responsible officer.
 - 2. Submit copy of report of laboratory facilities' inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- B. Testing, inspections, and source quality control may occur on or off Project site. Perform off-site testing as required by Engineer or Owner.
- C. Reports shall be submitted by independent firm to Engineer, Contractor, and authorities having jurisdiction, in duplicate, indicating observations and results of tests and compliance or noncompliance with Contract Documents.
 - 1. Submit final report indicating correction of Work previously reported as noncompliant.
- D. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Engineer and independent firm 24 hours before expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
- E. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- F. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- G. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Site. Cooperate with Engineer and Contractor in performance of services.
 - 3. Perform indicated sampling and testing of products according to specified standards.

4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Engineer and Contractor of observed irregularities or nonconformance of Work or products.
 6. Perform additional tests required by Engineer.
 7. Attend preconstruction meetings and progress meetings.
- H. Agency Reports: After each test, promptly submit 2 copies of report to Engineer, Contractor, and authorities having jurisdiction. When requested by Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and Specification Section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- I. Limits on Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment and commissioning s applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer is subject to approval of Owner.
- C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 01 33 00 "Submittal Procedures," Article 1.14.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary electricity.
 - 2. Temporary lighting for construction purposes.
 - 3. Temporary ventilation.
 - 4. Temporary water service.
 - 5. Temporary sanitary facilities.
 - 6. Field offices and sheds.
 - 7. Vehicular access.
 - 8. Parking.
 - 9. Progress cleaning and waste removal.
 - 10. Project identification.
 - 11. Traffic regulation.
 - 12. Fire-prevention facilities.
 - 13. Barriers.
 - 14. Security.
 - 15. Water control.
 - 16. Dust control.
 - 17. Erosion and sediment control.
 - 18. Pollution control.
 - 19. Removal of utilities, facilities, and controls.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 60 00 "Product Requirements."
 - 3. Section 01 57 23 "Temporary Stormwater Pollution Control."

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 - 3. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required from utility source as needed for construction operation.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Maintain lighting and provide routine repairs.

1.5 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.6 TEMPORARY WATER SERVICE

- A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations.

1.7 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of Project mobilization.

1.8 FIELD OFFICES AND SHEDS

- A. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and inspection of products to suit requirements in Section 01 60 00 "Product Requirements."
- B. Preparation: Fill and grade Sites for temporary structures sloped for drainage away from buildings.

1.9 VEHICULAR ACCESS

- A. Construct temporary access roads from public thoroughfares to serve construction area, of width and load-bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- C. Extend and relocate vehicular access as Work progress requires and provide detours as necessary for unimpeded traffic flow.
- D. Locate as indicated on Drawings.
- E. Provide unimpeded access for emergency vehicles. Maintain 20 foot-wide driveways with turning space between and around combustible materials.
- F. Provide and maintain access to fire hydrants and control valves free of obstructions.
- G. Provide means of removing mud from vehicle wheels before entering streets.
- H. Use designated existing on-Site roads for construction traffic.

1.10 PARKING

- A. Arrange for temporary gravel surface parking areas to accommodate construction personnel.
- B. Locate as approved by Engineer approved by Owner.
- C. If Site space is not adequate, provide additional off-site parking.
- D. Use of designated areas of existing on-site streets and driveways used for construction traffic is not permitted. Tracked vehicles are not allowed on paved areas.
- E. Use of designated areas of existing parking facilities used by construction personnel is permitted.
- F. Do not allow heavy vehicles or construction equipment in parking areas.
- G. Do not allow vehicle parking on existing pavement.

- H. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, ice, and the like.
 - 2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.
- I. Removal, Repair:
 - 1. Remove temporary materials and construction at Substantial Completion.
 - 2. Remove underground Work and compacted materials to depth of 2 feet; fill and grade Site as indicated.
 - 3. Repair existing facilities damaged by use, to original condition.
- J. Mud from Site vehicles: Provide means of removing mud from vehicle wheels before entering streets.

1.11 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.
- C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from Site as needed and dispose of off-Site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION

- A. Project Identification Sign:
 - 1. One painted sign of construction, design, and content shown on Drawings, location designated.
 - 2. Content:
 - a. Project number, title, logo, and name of Owner.
 - b. Names and titles of authorities.
 - c. Names and titles of Engineer and Consultants.
 - d. Name of Prime Contractor.
- B. Project Informational Signs:
 - 1. Painted informational signs of same colors and lettering as Project identification sign or standard products; size lettering for legibility at 100-foot distance.
 - 2. Provide sign at each field office and storage shed. Relocate as Work progress requires.
 - 3. No other signs are allowed without Owner's permission except those required by law.
- C. Design sign and structure to withstand 60-mph wind velocity.
- D. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.
- E. Show content, layout, lettering, color.
- F. Sign Materials:
 - 1. Structure and Framing: New wood metal, structurally adequate.
 - 2. Sign Surfaces: Exterior grade plywood with medium-density overlay, minimum of 3/4-inch-thick, standard large sizes to minimize joints.

3. Rough Hardware: Galvanized or aluminum.
 4. Paint and Primers: Exterior quality, 2 coats; sign background of white color as selected.
 5. Lettering: Exterior quality paint, contrasting colors as selected.
- G. Installation:
1. Install Project identification sign within 15 days after date established by Notice to Proceed.
 2. Erect at location of high public visibility adjacent to main entrance to Site.
 3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
 4. Install sign surface plumb and level, with butt joints. Anchor securely.
 5. Paint exposed surfaces of sign, supports, and framing.
- H. Maintenance: Maintain clean signs and supports; repair deterioration and damage.
- I. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.13 TRAFFIC REGULATION

- A. Signs, Signals, and Devices:
1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
 2. Automatic Traffic Control Signals: As approved by local jurisdictions.
 3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
 4. Flag Person Equipment: As required by authorities having jurisdiction.
- B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- D. Haul Routes:
1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
- E. Traffic Signs and Signals:
1. Provide signs at approaches to site and on site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
 2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
 3. Relocate signs and signals as Work progresses, to maintain effective traffic control.
- F. Removal:
1. Remove equipment and devices when no longer required.
 2. Repair damage caused by installation.
 3. Remove post settings to depth of 2 feet.

1.14 FIRE-PREVENTION FACILITIES

- A. Prohibit smoking within buildings under construction and demolition. Designate area on Site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting, welding, and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

1.15 BARRIERS

- A. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.16 SECURITY

- A. Security Program:
 - 1. Protect Work on existing premises from theft, vandalism, and unauthorized entry.
 - 2. Initiate program at Project mobilization.
 - 3. Maintain program throughout construction period until final completion.
- B. Entry Control:
 - 1. Restrict entrance of persons and vehicles to Project site and existing facilities.
 - 2. Allow entrance only to authorized persons with proper identification.
 - 3. Maintain log of workers and visitors and make available to Owner on request.
 - 4. Owner will control entrance of persons and vehicles related to Owner's operations.

1.17 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
- B. Protect site from puddles or running water. Provide water barriers as required to protect Site from soil erosion.

1.18 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere and into Owner-occupied areas.

1.19 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.
- F. Comply with sediment and erosion control plan as developed by Contractor and permitted by Midland County and Texas Department of Transportation under specification Section 01 57 23 "Temporary Stormwater Pollution Control."

1.20 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.21 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials before substantial completion inspection.
- B. Remove underground installations to minimum depth of 2 feet. Restore grade to pre-construction condition.
- C. Clean and repair damage caused by installation or use of temporary Work.
- D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 57 23 - TEMPORARY STORMWATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Contractor responsibilities.
 - 2. Submittals.
 - 3. Erosion and sediment controls.
- B. Related Requirements:
 - 1. Local jurisdiction requirements.
 - 2. Other Division 01 Specification Sections apply to Work of this Section.

1.2 CONTRACTOR RESPONSIBILITIES

- A. Contractor is solely responsible for meeting all TCEQ and EPA requirements for stormwater pollution prevention:
 - 1. Develop a Stormwater Pollution Prevention Plan (SWPPP) if not provided;
 - 2. File Notice of Intent (NOI) and include Owner as an "Operator;"
 - 3. Install and maintain all erosion control measures and best management practices (BMPs);
 - 4. Perform inspections and prepare reports; and
 - 5. File Notice of Termination (NOT).

1.3 SUBMITTALS

- A. Submit to Engineer, SWPPP, Submittal Procedures, and all other related documentation conforming to Section 01 33 00 "Submittal Procedures."

1.4 EROSION AND SEDIMENT CONTROLS

- A. Implement structural measures to divert flows from exposed soils, temporarily store flows, or otherwise limit run-off and discharge of pollutants from exposed areas of site. Timely implement structural practices as specified in SWPPP during construction to minimize erosion and sediment run-off.
- B. Stabilized Ingress/Egress:
 - 1. Provide stabilized access to/from construction site as soon as practical per SWPPP.
 - 2. Ensure any soil tracked off-site is cleaned from existing roads, alleys, and any adjacent properties as soon as possible. Check for any pollutants (mud, silt, sand, cement, construction materials, etc.) tracked or washed off-site and perform necessary clean-up measures at the end of each work day.
- C. Silt Fences/Diversion Berms: Provide as a temporary structural practice to minimize erosion and sediment runoff, as necessary. Properly install silt fences and/or diversion berms to effectively retain sediment immediately after completing each phase of Work where erosion would occur as sheet and rill erosion (clearing and grubbing, excavation, embankment, grading, etc.).

- D. Sand/Gravel Bags: Provide as a temporary structural practice to minimize erosion and sediment runoff. Properly place bags to effectively retain sediment immediately after completing each phase of Work (clearing and grubbing, excavation, embankment, grading, etc.) in each independent runoff area (after clearing and grubbing between ridge and drain, place bags as work progresses, remove/replace/relocate bags as needed for Work to progress in drainage area). Replace sand/gravel bags no longer in good condition, as needed.
- E. Site Stabilization:
 - 1. Minimize surface area of base soil material at one time.
 - 2. Implement necessary stabilization measures including:
 - a. Temporary/permanent seeding/sodding;
 - b. Mulching;
 - c. Geotextiles;
 - d. Vegetative buffer strips;
 - e. Paving;
 - f. Rock riprap; and/or
 - g. Rock-filled gabions.
 - h. Inlet protection.
 - 3. Implement stabilization measures per SWPPP.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section Includes:
 - 1. Products.
 - 2. Product delivery requirements.
 - 3. Product storage and handling requirements.
 - 4. Product options.
 - 5. Equipment electrical characteristics and components.
- B. Related Requirements:
 - 1. Other Division 01 Specification Sections apply to Work of this Section.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. All iron and steel products produced through a manufacturing process and used in Project shall be produced in the United States in accordance with Government Code 2252.202, et. seq., as amended. Domestic Products: Except where specified otherwise, domestic products are required and interpreted to mean products mined, manufactured, fabricated, or produced in United States or its territories.
- E. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.
- F. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products according to manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.
- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.

- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 01 25 00 "Substitution Procedures."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 70 00 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes:
 - 1. Examination.
 - 2. Preparation.
 - 3. Field engineering.
 - 4. Execution.
 - 5. Cutting and patching.
 - 6. Protecting installed construction.
 - 7. Closeout procedures.
 - 8. Project record documents.
 - 9. Product warranties and product bonds.
 - 10. Maintenance service.
 - 11. Final cleaning.
- B. Related Requirements:
 - 1. Other Division 01 Specifications apply to Work of this Section.

1.2 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.

1.3 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.4 FIELD ENGINEERING

- A. Employ land surveyor registered in State of Texas and acceptable to Owner.
- B. Locate and protect survey controls and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is established by Owner-provided survey and indicated on Drawings.
- D. Verify setbacks and easements; confirm Drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.

- F. Submit copy of certificate signed by land surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey Work as Work progresses.
- H. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.
- I. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer.

1.5 EXECUTION

- A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project site during installation and until completion of construction.
- B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
 - 1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
 - 2. Physically separate products in place and provide electrical insulation or protective coatings to prevent galvanic action or corrosion between dissimilar metals.
 - 3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual effect choices to Architect/Engineer for final decision.
- E. Allow for expansion of materials and building movement.
- F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
 - 1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
 - 2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.
- G. Mounting Heights: Where not indicated, mount individual units of Work at industry-recognized standard mounting heights for particular application indicated.
 - 1. Refer questionable mounting height choices to Engineer for final decision.
 - 2. Elements Identified as Handicap Accessible: Comply with applicable codes and regulations.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.
- I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

1.6 CUTTING AND PATCHING

- A. Employ skilled and experienced installers to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting the following:
 - 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 or separate Contractor.
- C. Execute cutting, fitting, and patching, including excavation and fill. to complete Work and to accomplish the following:
 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 nonconforming 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 to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products according to requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduits, 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 assembly, refinish entire unit.
- J. Identify the hazardous substances or conditions exposed during the Work to Engineer for decision or remedy.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual Specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

1.8 CLOSEOUT PROCEDURES

- A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
 1. Submit maintenance manuals, Project record documents, digital images of construction photographs, and other similar final record data in compliance with this Section.
 2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.
 3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
 4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
 5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
 6. Make final change-over of locks and transmit keys directly to Owner. Advise Owner's personnel of change-over in security provisions.
 7. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.

8. Perform final cleaning according to this Section.
- B. Substantial Completion Inspection:
 1. When Contractor considers Work to be substantially complete, submit to Engineer:
 - a. Written certificate that Work, or designated portion, is substantially complete.
 - b. List of items to be completed or corrected (initial punch list).
 2. Within seven days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
 3. Should Engineer determine that Work is not substantially complete:
 - a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
 - b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer.
 - c. Engineer will reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.
 4. When Engineer finds that Work is substantially complete, Engineer will:
 - a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial Completion , accompanied by Contractor's list of items to be completed or corrected as verified and amended by Engineer and Owner (final punch list).
 - b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
 5. After Work is substantially complete, Contractor shall:
 - a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
 - b. Complete Work listed for completion or correction within time period stipulated.
- C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.
 1. When Contractor considers Work to be complete, submit written certification that:
 - a. Contract Documents have been reviewed.
 - b. Work has been examined for compliance with Contract Documents.
 - c. Work has been completed according to Contract Documents.
 - d. Work is completed and ready for final inspection.
 2. Submittals: Submit following:
 - a. Final punch list indicating all items have been completed or corrected.
 - b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
 - d. Accounting statement for final changes to Contract Sum.
 - e. Contractor's affidavit of payment of debts and claims on AIA G706 - Contractor's Affidavit of Payment of Debts and Claims.
 - f. Contractor affidavit of release of liens on AIA G706A - Contractor's Affidavit of Release of Liens.
 - g. Consent of surety to final payment on AIA G707 - Consent of Surety to Final Payment Form.
 3. Perform final cleaning for Contractor-soiled areas according to this Section.

- D. Final Completion Inspection:
 - 1. Within 7 days after receipt of request for final inspection, Engineer will make inspection to determine whether Work or designated portion is complete.
 - 2. Should Engineer consider Work to be incomplete or defective:
 - a. Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
 - b. Contractor shall remedy stated deficiencies and send second written request to Engineer that Work is complete.
 - c. Engineer will reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.

1.9 PROJECT RECORD DOCUMENTS

- A. Maintain on Site 1 set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates used.
 - 3. Changes made by Addenda, bulletin, Change Order, and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
 - 1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
 - 2. Include locations of concealed elements of the Work.
 - 3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
 - 4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
 - 5. Identify and locate existing buried or concealed items encountered during Project.
 - 6. Measured depths of foundations in relation to finish main floor datum.
 - 7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 9. Field changes of dimension and detail.
 - 10. Details not on original Drawings.
- G. Submit marked-up paper copy documents to Engineer with claim for final Application for Payment.
- H. Submit PDF electronic files of marked-up documents to Engineer with claim for final Application for Payment.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit in PDF composite electronic indexed file.
- B. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- C. Contents: Prepare table of contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by process flow and subdivided by Specification Section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Include the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
 - g. Safety precautions to be taken when operating and maintaining or working near equipment.
 - 3. Part 3: Project documents and certificates, including the following:
 - a. Shop Drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Originals of warranties and bonds.

1.11 MANUAL FOR MATERIALS AND FINISHES

- A. Submit 2 copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer will review draft and return 1 copy with comments.
- B. For equipment or component parts of equipment put into service during construction and operated by Owner, submit documents within 10 days after acceptance.
- C. Submit 1 copy of completed volumes 15 days prior to final inspection

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.
- B. Deliver to place in location as directed by Owner; obtain receipt prior to final payment.

1.13 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
 - 1. Employ experienced personnel or professional cleaning firm.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces; and vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, gutters, downspouts, and drainage systems.

- F. Clean Site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from Site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in-place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Form stripping.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 20 00 "Concrete Reinforcing:" Reinforcing steel and required supports for cast-in-place concrete.

1.2 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 117 - Specification 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 & Paper Association:
 - 1. AF&PA - National Design Specification (NDS) for Wood Construction.
- C. American Society of Mechanical Engineers:
 - 1. ASME A17.1 - Safety Code for Elevators and Escalators.
- D. APA - The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard - Structural Plywood.
- E. 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.
 - 3. ASTM E96M - Standard Test Methods for Water Vapor Transmission of Materials.
- F. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard No. 17 Grading Rules for West Coast Lumber.

1.3 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Requirements for coordination.
- B. Coordinate Work of this Section with other Sections of Work in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate:
 - a. Formwork, shoring, and reshoring.
 - b. Pertinent dimensions, openings, methods of construction, types of connections, materials, joint arrangement and details, ties and shores, location of framing, studding and bracing, and temporary supports.
 - c. Sequence and timing of erection and stripping, assumed compressive strength at time of stripping, height of lift, and height of drop during placement.
 - d. Vertical, horizontal, and special loads according to ACI 347, and camber diagrams when applicable.
 - e. Notes to formwork erector showing size and location of conduits and piping embedded in concrete according to ACI 318.
 - f. Procedure and schedule for removal of shores and installation and removal of reshores.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Delegated Design Submittals:
 - 1. Submit signed and sealed Shop Drawings with design calculations and assumptions for formwork shoring.

1.5 QUALITY ASSURANCE

- A. Perform Work according to ACI 347 , 301 , and 318.
- B. For wood products furnished for Work of this Section, comply with AF&PA.
- C. Perform Work according to City of Midland standards.

1.6 QUALIFICATIONS

- A. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Texas.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Design, engineer, and construct formwork, shoring, and bracing according to ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line, and dimension as indicated on Drawings.

2.2 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.

2.3 PREFABRICATED FORMS

- A. Manufacturers:
 - 1. EFCO - Economy Forms Corp.
 - 2. Molded Fiber Glass Construction Products.

3. Sonoco Products Co.
 4. Symons by Dayton Superior.
 5. Wall-Ties & Forms, Inc.
 6. Western Forms.
 7. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- B. Preformed Steel Forms:
1. Description: Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
 2. Minimum Thickness: 16 gauge.
- C. FRP Forms: Matched, tightly fitted, and stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- D. Pan:
1. Material: Steel.
 2. Configuration: Size and profile as required.
- E. Steel Forms:
1. Description: Sheet steel, suitably reinforced.
 2. Design: For particular use as indicated on Drawings.
- F. Form Liners: Smooth, durable, grainless, and non-staining hardboard unless otherwise indicated on Drawings.
- G. Framing, Studding, and Bracing: Stud.

2.4 FORMWORK ACCESSORIES

- A. Form Ties:
1. Type: Removable Snap off; cone.
 2. Material: Galvanized.
 3. Length: Adjustable.
 4. Furnish waterproofing washer.
 5. Free of defects capable of leaving holes larger than 1 inch in concrete surface.
 6. Manufacturers:
 - a. Heckmann Building Products, Inc.
 - b. Symons by Dayton Superior.
 - c. Wall-Ties & Forms, Inc.
 - d. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- B. Spreaders:
1. Description: Standard, non-corrosive metal-form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face.
 2. Wire ties, wood spreaders, or through bolts are not permitted.
- C. Form Release Agent:
1. Description: Colorless mineral oil that will not stain concrete or absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.
 2. Manufacturers:
 - a. Architectural Concrete Chemicals, LLC.
 - b. Nox-Crete Products Group.
 - c. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- D. Vapor Retarder:
1. Description: Polyethylene sheet.
 2. Thickness: 8 mils.
- E. Bituminous Joint Filler: Comply with ASTM D1751.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength, and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify lines, levels, and centers before proceeding with formwork.
- C. Verify that dimensions agree with Shop Drawings.
- D. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Engineer before proceeding.

3.2 INSTALLATION

- A. Earth Forms:
 - 1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
 - 2. Trim sides and bottom of earth forms.
 - 3. Construct wood edge strips at top of each side of trench to secure reinforcing and to prevent trench from sloughing.
 - 4. Form sides of footings where earth sloughs.
 - 5. Tamp earth forms firm and clear them of debris and loose material before depositing concrete.
- B. Formwork:
 - 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 indicated otherwise on Drawings.
 - 4. Positioning:
 - a. Carefully verify horizontal and vertical positions of forms.
 - b. Correct misaligned or misplaced forms before placing concrete.
 - 5. Complete wedging and bracing before placing concrete.
 - 6. Erect formwork, shoring, and bracing to achieve design requirements according to ACI 301 and 318.
 - 7. Stripping:
 - a. Arrange and assemble formwork to permit dismantling and stripping.
 - b. Do not damage concrete during stripping.
 - c. Permit removal of remaining principal shores.
 - 8. Obtain approval of Engineer before framing openings in structural members not indicated on Drawings.
 - 9. Install fillet and chamfer strips on external corners of beams , joists , and columns.
 - 10. Install void forms according to manufacturer instructions.
 - 11. Do not reuse wood formwork more than 3 times for concrete surfaces to be exposed to view.
 - 12. Do not patch formwork.
 - 13. Leave forms in place for minimum number of days according to ACI 347.

- C. Form Removal:
 - 1. 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 Engineer.
 - 2. Loosen forms carefully; do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
 - 3. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged.
 - 4. Discard damaged forms.
 - 5. Form Release Agent:
 - a. Apply according to manufacturer instructions.
 - b. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
 - c. Do not apply form release agent if concrete surfaces are indicated to receive special finishes or applied coverings that may be affected by agent.
 - d. Soak inside surfaces of untreated forms with clean water, and keep surfaces coated prior to placement of concrete.
 - 6. 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.
 - d. Ensure that water and debris drain to exterior through cleanout ports.
 - e. Cold Weather:
 - 1) During cold weather, remove ice and snow from within forms.
 - 2) Do not use de-icing salts.
 - 3) Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure; use compressed air or other dry method to remove foreign matter.
 - 7. Reuse and Coating of Forms:
 - a. Thoroughly clean forms and reapply form coating before each reuse.
 - b. For exposed Work, do not reuse forms with damaged faces or edges.
 - c. Apply form coating to forms according to manufacturer instructions.
 - d. Do not coat forms for concrete indicated to receive "scored finish."
 - e. Apply form coatings before placing reinforcing steel.
- D. 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-sized sheets of form liners and plywood wherever possible.
 - 5. Tape joints to prevent protrusions in concrete.
 - 6. Apply forming and strip wood forms in a manner to protect corners and edges.
 - 7. Level and continue horizontal joints.
 - 8. Keep wood forms wet until stripped.
- E. Forms for Surfaces to Receive Membrane Waterproofing:
 - 1. Use plywood or steel forms.
 - 2. After erection of forms, tape form joints to prevent protrusions in concrete.
- F. Framing, Studding, and Bracing:
 - 1. Maximum Spacing of Studs:
 - a. Boards: Maximum 16 inches o.c.
 - b. Plywood: 12 inches o.c.

2. Size framing, bracing, centering, and supporting members for sufficient strength to maintain shape and position under imposed loads from construction operations.
 3. Construct beam soffits of material minimum 2 inches thick.
 4. Distribute bracing loads over base area on which bracing is erected.
 5. When placed on ground, protect against undermining, settlement, and accidental impact.
- G. Form Anchors and Hangers:
1. Do not use anchors and hangers leaving exposed metal at concrete surface.
 2. Symmetrically arrange hangers supporting forms from structural-steel members to minimize twisting or rotation of member.
 3. Penetration of structural-steel members is not permitted.
- H. Inserts, Embedded Parts, and Openings:
1. Install formed openings for items to be embedded in or passing through concrete Work.
 2. Locate and set in place items required to be cast directly into concrete.
 3. Install accessories straight, level, and plumb, and ensure that items are not disturbed during concrete placement.
 4. Joints:
 - a. Install waterstops continuous without displacing reinforcement.
 5. Openings:
 - a. Provide temporary ports or openings in formwork as required to facilitate cleaning and inspection.
 - b. Locate openings at bottom of forms to allow flushing water to drain.
 6. Close temporary openings with tight-fitting panels, flush with inside face of forms, and neatly fitted such that joints will not be apparent in exposed concrete surfaces.
- I. Form Ties:
1. Provide sufficient strength and 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 indicated otherwise on Drawings.
- J. Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- K. Construction Joints:
1. Install surfaced pouring strip where construction joints intersect on exposed surfaces to provide straight line at joints.
 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 3. Appearance:
 - a. Show no overlapping of construction joints.
 - b. Construct joints to present same appearance as butted plywood joints.
 4. Arrange joints in continuous line straight, true, and sharp.
- L. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, waterstops, and other features.
 2. Do not embed wood or uncoated aluminum in concrete.
 3. Obtain installation and setting information for embedded items furnished under other Sections.
 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.

5. Ensure that conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 regarding size and location limitations.
- M. Openings for Items Passing through Concrete:
1. Frame openings in concrete where indicated on Drawings.
 2. Establish exact locations, sizes, and other conditions required for openings and attachment of Work specified under other Sections.
 3. Coordinate Work to avoid cutting and patching of concrete after placement.
 4. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- N. Screeds:
1. Set screeds and establish levels for tops of and finish on concrete slabs.
 2. Slope slabs to drain where required or as indicated on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms; remove freestanding water.
- O. Screenshot Supports:
1. For concrete over waterproof membranes and vapor retarder membranes, use cradle-, pad-, or base-type screed supports that will not puncture membrane.
 2. Staking through membrane is not permitted.
- P. 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.
 3. Remove chips, sawdust, and other debris.
 4. Thoroughly blow out forms with compressed air just before concrete is placed.

3.3 TOLERANCES

- A. Construct formwork to maintain tolerances according to ACI 301 and 318.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- C. Inspection:
1. Inspect erected formwork, shoring, and bracing to ensure that Work complies with formwork design and that supports, fastenings, wedges, ties, and items are secure.
 2. Notify Engineer after placement of reinforcing steel in forms but prior to placing concrete.
 3. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 10 00 "Concrete Forming and Accessories:" Form materials, waterstops, and accessories required to form cast-in-place concrete.
 - 3. Section 03 30 00 "Cast-in-Place Concrete:" Cast-in-place or in-situ concrete for structural building frame, slabs on grade, and other concrete components associated with building.
 - 4. Section 03 38 00 "Post-Tensioned Concrete:" On-Site post-tensioning of cast-in-place concrete, structural building framing members, and slabs.
 - 5. Section 03 41 00 "Precast Structural Concrete": Reinforcement for precast structural concrete.

1.2 REFERENCE STANDARDS

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 530/530.1 - Building Code Requirements and Specification for Masonry Structures.
 - 4. ACI SP-66 - ACI Detailing Manual.
- B. American Welding Society:
 - 1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
 - 2. AWS D1.4M - Structural Welding Code - Reinforcing Steel.
- C. ASTM International:
 - 1. ASTM A184 - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
 - 2. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 3. ASTM A704 - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
 - 4. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
 - 5. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
 - 6. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
 - 7. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
 - 8. ASTM A934 - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.

9. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
 10. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- D. Concrete Reinforcing Steel Institute:
1. CRSI 10-MSP - Manual of Standard Practice.
 2. CRSI 10PLACE - Placing Reinforcing Bars.

1.3 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Requirements for coordination.
- B. Coordinate Work of this Section with placement of formwork, formed openings, and other Work.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Shop Drawings:
 1. Indicate bar sizes, spacings, locations, splice locations, and quantities of reinforcing steel and welded wire fabric.
 2. Indicate bending and cutting schedules.
 3. Indicate supporting and spacing devices.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Submit certified copies of mill test report of reinforcement materials analysis.
- E. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statement:
 1. Welders: Qualify procedures and personnel according to AWS D1.1.

1.5 QUALITY ASSURANCE

- A. Perform Work according to ACI 301 and ACI 318.
- B. Prepare Shop Drawings according to ACI SP-66.
- C. Perform Work according to City of Midland standards.

1.6 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months for employed weld types.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements:" Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 1. Protect materials from moisture by storing in clean, dry location remote from construction operations areas.

2. Provide additional protection according to manufacturer instructions.

1.8 EXISTING CONDITIONS

- A. Field Measurements:
 1. Verify field measurements prior to fabrication.
 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 1. Comply with ASTM A615.
 2. Yield Strength: 60 ksi.
 3. Billet Bars: Deformed.
 4. Finish: Uncoated.

2.2 FABRICATION

- A. Fabricate concrete reinforcement according to ACI 318.
- B. Form standard hooks for, 90-degree bends as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters according to ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form spiral column reinforcement from minimum 3/8-inch-diameter continuous plain bar or wire.
- F. Form ties and stirrups from following:
 1. Bars No. 10 and Smaller: No. 3 deformed bars.
 2. Bars No. 11 and Larger: No. 4 deformed bars.
- G. Weld reinforcement according to AWS D1.4.
- H. Splicing:
 1. If not indicated on Drawings, locate reinforcement splices at point of minimum stress.

2.3 ACCESSORY MATERIALS

- A. Tie Wire:
 1. Minimum 16 gauge, annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacers:
 1. Size and Shape: To strengthen and support reinforcement during concrete placement conditions.
- C. Special Chairs, Bolsters, Bar Supports, and Spacers Adjacent to Weather-Exposed Concrete Surfaces:
 1. Material: Plastic-coated steel.
 2. Size and Shape: To meet Project conditions.
- D. Reinforcing Splicing Devices:
 1. Type: Exothermic welding type; full tension and compression.
 2. Manufacturers:
 - a. Dur-O-Wal; a Hohmann & Barnard company.

2.4 SOURCE QUALITY CONTROL

- A. Provide shop inspection and testing of completed assembly.
- B. Section 01 40 00 "Quality Requirements:" Requirements for testing, inspection, and analysis.
- C. Certificate of Compliance:
 - 1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 2. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Place, support, and secure reinforcement against displacement.
- B. Do not deviate from required position beyond specified tolerance.
- C. Do not weld crossing reinforcement bars for assembly.
- D. Do not displace or damage vapor retarder.
- E. Accommodate placement of formed openings.
- F. Spacing:
 - 1. Space reinforcement bars with minimum clear spacing according to ACI 318.
 - 2. If bars are indicated in multiple layers, place upper bars directly above lower bars.
- G. Maintain minimum concrete cover around reinforcement according to ACI 318 as follows:
 - 1. Footings and Concrete Formed against Earth: 3 inches.
 - 2. Concrete Exposed to Earth or Weather:
 - a. No. 6 Bars and Larger: 2 inches.
 - b. No. 5 Bars and Smaller: 1-1/2 inches.
 - 3. Supported Slabs, Walls, and Joists:
 - a. No. 14 Bars and Larger: 1-1/2 inches.
 - b. No. 11 Bars and Smaller: 3/4-inch.
 - 4. Beams and Columns: 1-1/2 inches.
 - 5. Shell and Folded Plate Members:
 - a. No. 6 Bars and Larger: 3/4-inch.
 - b. No. 5 Bars and Smaller: 1/2-inch.
- H. Splice reinforcing where indicated on Drawings and according to manufacturer's instructions.

3.2 TOLERANCES

- A. Section 01 40 00 "Quality Requirements:" Requirements for tolerances.
- B. Install reinforcement within following tolerances for flexural members, walls, and compression members:
 - 1. Reinforcement Depth Greater Than 8 Inches:
 - a. Depth Tolerance: Plus or Minus 3/8-inch.
 - b. Concrete Cover Tolerance: Minus 3/8-inch.
 - 2. Reinforcement Depth Less Than or Equal to 8 Inches:
 - a. Depth Tolerance: Plus or Minus 1/2-inch.
 - b. Concrete Cover Tolerance: Minus 1/2-inch.
- C. Foundation Walls: Install reinforcement within tolerances according to ACI 530/530.1.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- C. Perform field inspection and testing according to ACI 318.
- D. Provide unrestricted access to Work and cooperate with appointed inspection and testing firm.
- E. Reinforcement Inspection:
 - 1. Placement Acceptance: Inspect specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Welding: Inspect welds according to 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 if formed from steel other than ASTM A706.
 - 5. Continuous Weld Inspection: Inspect reinforcement according to ACI 318.
 - 6. Periodic Weld Inspection: Inspect other welded connections.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 10 00 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
 - 3. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

- A. Product Data: For each of the following.
 - 1. Portland cement.
 - 2. Fly ash.
 - 3. Slag cement.
 - 4. Blended hydraulic cement.
 - 5. Aggregates.
 - 6. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
 - 7. Vapor retarders.
 - 8. Liquid floor treatments.
 - 9. Curing materials.
 - 10. Joint fillers.
- B. Design Mixtures: For each concrete mixture, include the following:
 - 1. Mixture identification.
 - 2. Minimum 28-day compressive strength.
 - 3. Durability exposure class.
 - 4. Maximum w/cm.
 - 5. Calculated equilibrium unit weight, for lightweight concrete.
 - 6. Slump limit.
 - 7. Air content.
 - 8. Nominal maximum aggregate size.

9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
 10. Intended placement method.
 11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Shop Drawings:
1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.
- D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
 2. Location within Project.
 3. Exposure Class designation.
 4. Formed Surface Finish designation and final finish.
 5. Final finish for floors.
 6. Curing process.
 7. Floor treatment if any.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Curing compounds.
 4. Vapor retarders.
 5. Joint-filler strips.
- B. Material Test Reports: For the following, from a qualified testing agency:
1. Portland cement.
 2. Fly ash.
 3. Slag cement.
 4. Blended hydraulic cement.
 5. Aggregates.
 6. Admixtures:
- C. Preconstruction Test Reports: For each mix design.
- D. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.6 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Normal-Weight Aggregates: ASTM C33, coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

2.4 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.5 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 - 2. Slag Cement: 50 percent by mass.
 - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
 - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Engineer.
 - 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.3 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
 2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.

2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.4 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2-inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch wide or 1/2-inch deep.
 - b. Remove projections larger than 1/4-inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view, or to receive a rubbed finish,.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.5 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.

3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 4. Do not add water to concrete surface.
 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
 6. Apply a trowel finish to surfaces exposed to view.
 7. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and also no more than 1/16 inch in 2 feet.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
 2. Coordinate required final finish with Architect before application.

3.6 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 3. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 5. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
1. Cast-in inserts and accessories, as shown on Drawings.
 2. Screed, tamp, and trowel finish concrete surfaces.

3.7 CONCRETE CURING

- A. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Interior Concrete Floors:
 - a. Floors to Receive Urethane Flooring:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

3.8 TOLERANCES

- A. Conform to ACI 117.

3.9 PROTECTION

- A. Protect concrete surfaces as follows:
 1. Protect from petroleum stains.
 2. Diaper hydraulic equipment used over concrete surfaces.
 3. Prohibit vehicles from interior concrete slabs.
 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 5. Prohibit placement of steel items on concrete surfaces.
 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Removing surface debris.
 - 2. Removing above- and below-grade site improvements.
 - 3. Removing designated trees, shrubs, and other plant life.
 - 4. Disconnecting, capping or sealing, and abandoning site utilities in place.
 - 5. Stripping and stockpiling topsoil.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 50 00 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures."
 - 3. Section 02 41 19 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.

1.2 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath topsoil layers of a naturally-occurring soil profile, typified by less than 1-percent organic matter and few soil organisms.
- B. Surface Soil: Soil present at the top layer of existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, surface soil can be subsoil or improved gravel surface material.
- C. Topsoil: Top layer of soil profile consisting of existing native surface topsoil or existing in-place surface soil; zone where plant roots grow.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 MATERIAL OWNERSHIP

- A. Except for materials indicated to stockpile or otherwise remain Owner property, cleared materials shall become Contractor property and removed from Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Contractor shall document existing trees, plantings, adjoining construction, and site improvements to document preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.5 QUALITY ASSURANCE

- A. Conform to applicable code for disposal of debris,.

- B. Perform Work in accordance with State of Texas Department of Transportation standard.

1.6 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Contractor shall notify utility locator service Call Before You Dig Dig Safe System One Call for area where Project is located before site clearing.
- C. Do not commence site-clearing operations until temporary erosion- and sedimentation-control measures are in place.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Call Local Utility Line Information service not less than 3 working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.

3.2 PROTECTION

- A. Locate, identify, and protect from damage utilities indicated to remain.
- B. Protect trees, plant growth, and features designated to remain.
- C. Identify trees, shrubs, plant growth that must be removed or relocated and attain permission to do so from Authority Having Jurisdiction (AHJ).
- D. Protect and maintain benchmarks and survey control points from disturbance during construction.
- E. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to original condition, as acceptable to Owner.

3.3 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation is established.
- D. Remove erosion and sedimentation controls. Restore and stabilize areas disturbed during removal.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, seal or cap, cut, and plug utilities indicated to remove or be abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.
- B. Locate, identify, disconnect, cut, and plug utilities indicated to abandon in place.
- C. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions, then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Engineer not less than 3 days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Engineer's written permission.
- D. Excavate for and remove underground utilities indicated to remove.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or be relocated.
 - 2. Grind down or remove stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 12 inches below exposed subgrade.
 - 3. Chip removed tree branches and dispose off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 SURFACE SOIL STRIPPING

- A. Strip surface soil to depth of 6 inches to prevent intermingling with underlying subsoil or other waste materials.
- B. Stockpile surface soil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water.
 - 1. Limit height of surface soil stockpiles to 72 inches.
 - 2. Dispose surplus topsoil (that which exceeds quantity indicated to stockpile or reuse).
 - 3. Stockpile surplus topsoil to allow respreading deeper topsoil.
 - 4. Stockpile sufficient quantities of on-site topsoil to later spread a minimum 6-inch thickness of topsoil on landscaped (non-paved) Project areas.

3.7 DISPOSE SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose off Owner property.

END OF SECTION

SECTION 31 23 16.13 - TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating trenches for utilities from 5 feet outside building to utility service.
 - 2. Compacted fill from top of utility bedding to subgrade elevations.
 - 3. Backfilling and compaction.
- B. Related Sections:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 30 00 "Cast-In-Place Concrete:" Concrete materials.
 - 3. Section 31 23 23 "Fill:" General backfilling.

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 Rammer and a 457-mm Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft³.
 - 2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft³.
 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Midland, TCEQ, OSHA, and Texas Department of Transportation standard.

1.5 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Texas.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.7 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

- A. Perform Subsurface Utility Investigation (SUI) Level 'A' locating all utilities by hydro-vac or excavation as necessary for survey providing horizontal and vertical elevation data in reference to the Drawings prior to ordering materials and mobilizing to project. Findings will be submitted to Engineer allowing for design grade adjustments if they conflict with design based on Best Available Information prior to construction.
- B. Call Local Utility Line Information service at '811' and "One-Call' not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- C. Identify required lines, levels, contours, and datum locations.
- D. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Maintain and protect above and below grade utilities indicated to remain.
- G. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Do not advance open trench more than 200 feet ahead of installed pipe.
- C. Cut trenches to width indicated on Drawings. Remove water or materials that interfere with Work.
- D. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
- E. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.

- F. Do not interfere with 45 degree bearing splay of foundations.
- G. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.
- H. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- I. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.
- J. Remove excess subsoil not intended for reuse, from site.

3.4 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place fill material in continuous layers and compact .
- D. Maintain optimum moisture content of fill materials to attain required compaction density.

3.5 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 "Execution and Closeout Requirements:" Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Dewatering system.
 - 2. Surface water control system.
 - 3. System operation and maintenance.
 - 4. Water disposal.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Available Project Information: Subsurface investigation measured ground water levels as shown on Drawings.
 - 3. Section 01 57 23 "Temporary Stormwater Pollution Control."
 - 4. Section 31 23 16.13 "Trenching."
 - 5. Section 31 26 23 "Fill."

1.2 DEFINITIONS

- A. Dewatering:
 - 1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.
 - 2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations and trenches.
 - 3. Disposing of removed water.
- B. Surface Water Control: Removal of surface water within open excavations.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Dewatering Centrifugal Pumps:
 - 1. Basis of Measurement: By each calendar day operating.
 - 2. Basis of Payment: Includes pump, power unit, fuel, discharge header pipe, connections, fittings, and pump operation and maintenance.

1.4 REFERENCE STANDARDS

- A. ASTM C33 - Standard Specification for Concrete Aggregates.

1.5 COORDINATION

- A. Section 01 30 00 "Administrative Requirements," for coordination.
- B. Coordinate Work of this Section to permit following construction operations completed on dry and stable substrate:
 - 1. Trenching for utilities as specified in Section 31 23 16.13 "Trenching."
 - 2. Section 31 50 00 "Excavation Support and Protection."
 - 3. Section 01 57 23 "Temporary Stormwater Pollution Control."

- C. Section 01 30 00 "Administrative Requirements."
- D. Convene minimum 1 week prior to commencing Work of this Section.

1.6 SEQUENCING

- A. Section 01 10 00 "Summary," for requirements.
- B. Sequence Work of this Section to obtain required permits before dewatering operations.

1.7 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures," for requirements.
- B. Product Data:
 - 1. Submit sizes, capacities, priming method, and characteristics for dewatering pumps.
 - 2. Submit pumping equipment for control of surface water within excavation.
- C. Shop Drawings:
 - 1. Indicate dewatering system layout, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
 - 2. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.

1.8 QUALITY ASSURANCE

- A. Comply with authorities having jurisdiction for following:
 - 1. Water discharge and disposal from pumping operations.
- B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES) for stormwater discharge from Site.
- C. Perform Work according to City of Midland, Midland County, TCEQ, USEPA, and Texas Department of Transportation standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Furnish dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
- B. Standby Equipment:
 - 1. Store at Site and ready for immediate use upon failure of dewatering equipment.
 - 2. Dewatering Centrifugal Pumps: Per Contractor discretion to protect Work and Personnel given the means and time of Work performed;

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Design:
 - 1. Lower water table within areas of excavation to minimum 2 feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.

2. Prevent damage to adjacent properties, buildings, structures, utilities, and other facilities from construction operations.
3. Prevent loss of fines, quick condition, or softening of foundation subgrade.
4. Maintain stability of sides and bottoms of excavations and trenches.
5. Surface Water Control System: Collect and remove surface water and seepage entering excavation.

2.3 DEWATERING EQUIPMENT

- A. Select dewatering equipment to meet specified performance requirements.
- B. Surface Water Pumps:
 1. Type:
 - a. Self-priming.
 - b. Centrifugal, with semi-open, clog-resistant impeller.
 - c. Driver: Diesel Engine.
 - d. Minimum Rated Capacity: 1,125 gpm at 70-foot total head.
 2. Accessories:
 - a. Screened suction hose.
 - b. Discharge hoses as required to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements," for installation examination.
- B. Utility Service Locator:
 1. Call local utility service-line information at 811 or 'One-Call' not less than 3 working days before performing Work.
 2. Request that underground utilities be located and marked within and immediately surrounding construction areas.
 3. Identify required lines, levels, contours, and data.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements," for installation.
- B. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 DEWATERING SYSTEM

- A. Install dewatering system according to Shop Drawings.
- B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.
- C. Installation Standards: Install Work according to Midland County, City of Midland, TCEQ and Texas Department of Transportation standards.

3.4 SURFACE WATER CONTROL SYSTEM

- A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area, as specified in Section 01 57 23 "Temporary Stormwater Pollution Control."
- B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels storm drains settling basins according to requirements of authorities having jurisdiction.
- C. Control and remove unanticipated water seepage into excavation.

3.5 SYSTEM OPERATION AND MAINTENANCE

- A. Operate dewatering system continuously until backfilling is complete.
- B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.
- C. Monitoring:
 - 1. Conduct daily observation of dewatering system and monitoring system.
 - 2. Make required repairs and perform scheduled maintenance.
- D. Fill fuel tanks before tanks drop to 25 percent capacity.
- E. System Failure:
 - 1. If dewatering system cannot control water within excavation, notify Engineer and stop excavation Work.
 - 2. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.
 - 3. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.
- F. Modify dewatering and surface water control systems if operation causes/threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.
- G. Correct unanticipated pressure conditions affecting dewatering system performance.
- H. Do not discontinue dewatering operations without Engineer approval.

3.6 WATER DISPOSAL

- A. Discharge water into existing drainage channels , as specified in Section 01 57 23 "Temporary Stormwater Pollution Control."

3.7 SYSTEM REMOVAL

- A. Remove dewatering and surface water control systems after dewatering operations are discontinued.
- B. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

3.8 FIELD QUALITY CONTROL

- A. Section 01 70 00 "Execution and Closeout Requirements," for inspecting and testing.

- B. Testing:
 - 1. After dewatering system is installed, perform pumping test to determine at what point selected pumping rate lowers water level in well below pump intake.
 - 2. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

3.9 PROTECTION

- A. Section 01 70 00 "Execution and Closeout Requirements."

END OF SECTION

SECTION 31 23 23 - FILL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Backfilling site structures to subgrade elevations.
 - 2. Fill under paving.
 - 3. Fill for over-excavation.

- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 30 00 "Cast-in-Place Concrete:" Concrete materials.
 - 3. Section 31 05 13 "Soils for Earthwork:" Soils for fill.
 - 4. Section 31 05 16 "Aggregates for Earthwork:" Aggregates for fill.
 - 5. Section 31 05 19.13 "Geotextiles for Earthwork:" Geotextile fabric for placement over fill.
 - 6. Section 31 23 16.13 "Trenching:" Backfilling of utility trenches.

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg Rammer and a 457-mm Drop.
- B. ASTM International:
 - 1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³).
 - 2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method.
 - 3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
 - 4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 - 5. ASTM D6031 - Standard Test Method for Logging In Situ Moisture Content and Density of Soil and Rock by the Nuclear Method in Horizontal, Slanted, and Vertical Access Tubes.
 - 6. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.

1.4 QUALITY ASSURANCE

- A. Perform Work according to City of Midland, TCEQ and Texas Department of Transportation standards.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that subdrainage, dampproofing, and waterproofing installations have been inspected.
- C. Verify that underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural integrity of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation preparation.
- B. Compact subgrade to specified density requirements for subsequent backfill materials.
- C. Soft Subgrade:
 - 1. Cut out soft areas of subgrade not capable of compaction in place.
 - 2. Backfill with granular fill and compact to density equal to or greater than specified requirements for subsequent fill material.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations.
- B. Systematically backfill to allow maximum time for natural settlement.
- C. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces, and do not backfill with frozen materials.
- D. Place fill material in continuous layers and compact .
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Structures:
 - 1. Backfill against supported foundation walls.
 - 2. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- G. Remove surplus backfill materials from Site.
- H. Leave fill material stockpile areas free of excess fill materials.

3.4 TOLERANCES

- A. Section 01 40 00 "Quality Requirements:" Requirements for tolerances.
- B. Top Surface of Backfilling : Plus or minus 1 inch from required elevations.
- C. Top Surface of Backfilling under Paved Areas: Plus or minus 0.5 inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- C. Inspecting: Request visual inspection of bearing surfaces by Engineer before installing subsequent Work.
- D. Testing:
 - 1. In-Place Compaction Testing:
 - a. Density Tests: Comply with ASTM D6938.
 - b. Moisture Tests: Comply with ASTM D6031.
 - 2. If tests indicate that Work does not meet specified requirements, remove Work, replace, compact, and retest.
 - 3. Proof-roll compacted fill surfaces under , paving.

3.6 PROTECTION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for protecting finished Work.
- B. Reshape and recompact fills subjected to vehicular traffic during construction.

3.7 ATTACHMENTS

- A. Fill under Asphalt Concrete or Crushed Stone / Gravel Paving:
 - 1. Compact subsoil to 95 percent of maximum density.
- B. Fill to Correct Over-Excavation:
 - 1. Lean concrete; minimum compressive strength of 2,000 psi.
 - 2. Fill Type according to City of Midland standards and specifications; flush to specified elevation; compacted uniformly to 95 percent of maximum density.
- C. Fill over Drainage Piping Gravel Cover: Fill Type Crushed Stone; to 6 inches below finish grade; compacted uniformly to 95 percent of maximum density.

END OF SECTION

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes temporary excavation support and protection systems.
- B. Related Requirements:
 - 1. Section 01 32 33 "Photographic Documentation" for recording preexisting conditions and excavation support and protection system progress.
 - 2. Section 01 57 23 "Temporary Stormwater Pollution Control"
 - 3. Section 31 23 16.13 "Trenching"
 - 4. Section 31 23 19 "Dewatering"
 - 5. Section 31 23 23 "Fill"

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, performance properties, and dimensions of individual components and profiles, and calculations for excavation support and protection system.
- B. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified Professional Engineer.
 - 1. Include plans, elevations, sections, and details.
 - 2. Show arrangement, locations, and details of soldier piles, piling, lagging, tiebacks, bracing, and other components of excavation support and protection system according to engineering design.
 - 3. Indicate type and location of waterproofing.
 - 4. Include a written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation.
- C. Delegated-Design Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
 - 1. Professional Engineer: Experience with providing delegated-design engineering services of the type indicated, including documentation that Engineer is licensed in the state in which Project is located.
- B. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Existing Conditions: Using photographs or video recordings, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1.4 CLOSEOUT SUBMITTALS

- A. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Utilities: Do not interrupt any utility-serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - 1. Notify Construction Manager no fewer than 2 weeks in advance of proposed interruption of utility.
 - 2. Do not proceed with interruption of utility without Construction Manager's written permission.
- B. Survey Work: Engage a qualified land surveyor or Professional Engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks, and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified Professional Engineer, as defined in Section 01 40 00 "Quality Requirements," to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:
 - 1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
 - 2. Compliance with AASHTO Standard Specification for Highway Bridges or AASHTO LRFD Bridge Design Specification, Customary U.S. Units.
 - 3. Compliance with requirements of authorities having jurisdiction.
 - 4. Compliance with utility company requirements.

2.2 MATERIALS

- A. Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A36, ASTM A690, or ASTM A992.
- C. Steel Sheet Piling: ASTM A328, ASTM A572, or ASTM A690; with continuous interlocks.
 - 1. Corners: Roll-formed corner shape with continuous interlock.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.

3.2 INSTALLATION - GENERAL

- A. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

3.3 MAINTENANCE

- A. Monitor and maintain excavation support and protection system.
- B. Prevent surface water from entering excavations by grading, dikes, or other means.
- C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.4 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks as needed during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open.
 - 1. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions.
 - 2. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
- B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.
- C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

3.5 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.
 - 1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.

END OF SECTION

SECTION 33 01 10.58 - DISINFECTION OF WATER UTILITY PIPING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Disinfection of potable water distribution and transmission system.
 - 2. Testing and reporting of results.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 33 14 13 "Public Water Utility Distribution Piping."

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures."
- B. Disinfection:
 - 1. Basis of Measurement: Include costs for disinfection in unit cost for installing pipe.
 - 2. Basis of Payment: Includes labor, equipment, and materials necessary for disinfecting all potable water lines.

1.3 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites.
- B. AWWA B302 - Ammonium Sulfate.
- C. AWWA B303 - Sodium Chloride
- D. AWWA C651 - Disinfecting Water Mains.
- E. AWWA C655 - Field Dechlorination.
- F. Texas Commission on Environmental Quality (TCEQ), Title 30 Texas Administrative Code (30 TAC) Chapter 290 Subchapter D, Rules and Regulations for Public Water Systems.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures."
- B. Submit a Disinfection and Flushing Plan to include:
 - 1. Procedure description in accordance with AWWA 651.
 - 2. Source of water utilized during disinfection and flushing procedures.
 - 3. type of disinfectant.
 - 4. Calculations indicating quantities of disinfectants required to produce specified chlorine concentration.
 - 5. Required residence times.
 - 6. Means and location of disposing hyperchlorinated water used during disinfection process.
 - 7. Schedule.
- C. Product Data: Submit manufacturer information for proposed chemicals and treatment doses.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Certify that final water complies with disinfectant quality standards of TCEQ.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements."
- B. Submit a Disinfection Report to include:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and completion.
 - 3. Time, date, and test location.
 - 4. Field Quality Control Test Results.
 - 5. Name of person collecting samples.
 - 6. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
 - 7. Date and time of flushing start and completion.
 - 8. Disinfectant residual after flushing in ppm for each outlet tested.

1.6 QUALITY ASSURANCE

- A. Perform Work according to AWWA C651.
- B. Perform work according to Texas Commission on Environmental Quality and the City of Midland standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience and approved by Engineer.
- B. Applicator: Company specializing in manufacturing products specified herein with minimum 3 years' documented experience and approved by Engineer.
- C. Applicator: Person holding Water Operators License issued by Texas Commission on Environmental Quality shall perform or supervise work. Provide copy of valid license.

PART 2 - PRODUCTS

2.1 DISINFECTION CHEMICALS

- A. Forms of Chlorine for Disinfection:
 - 1. Hypochlorites, AWWA B300, Section 4.2 Chemical Requirements:
 - a. Calcium Hypochlorite shall contain no less than 65 percent available chlorine by weight when shipped.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements."
- B. Verify that piping system has been cleaned, inspected, and pressure tested.
- C. Verify that access fittings have been installed under Section 33 14 17 "Site Water Service Utility Laterals."
- D. Perform scheduling and disinfecting activity with startup, water pressure testing, adjusting and balancing, and demonstration procedures, including coordination with related systems.

- E. Before placing any water line into service and after completing pressure tests, thoroughly flush all pipes with water until all entrained dirt and mud is removed before introducing chlorinating material.

3.2 INSTALLATION

- A. Provide required equipment to perform Work of this Section.
- B. Methods for Disinfection:
 - 1. Tablet/Granule Method: Per AWWA C651 Disinfecting Water Mains, Section 4.3.
 - 2. Continuous-Feed Method: Per AWWA C651 Disinfecting Water Mains, Section 4.4.
 - 3. Slug Method: Per AWWA C651 Disinfecting Water Mains, Section 4.5.
 - 4. Spray Disinfection: Per AWWA C651 Disinfecting Water Mains, Section 4.6.
- C. Open and close all valves on lines disinfected several times during contact period.
- D. Flush line with clean water until residual chlorine is reduced to no less than 0.5 ppm.
- E. Flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements."
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting and balancing.
- C. A Resident Project Representative (RPR) shall be present all times when water samples are taken. Contractor shall coordinate with RPR.
- D. Disinfection, Flushing, and Sampling:
 - 1. Disinfect pipeline installation according to AWWA C651.
 - 2. Use of liquid chlorine is not permitted.
 - 3. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing existing system or is acceptable for domestic use.
 - 4. Disposal:
 - a. Legally dispose of chlorinated water.
 - b. If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
 - 5. After final flushing and before pipeline is connected to existing system or placed in service, certify that disinfectant level meets quality standards of Texas Commission on Environmental Quality.
- E. Take 1 sample of water per 1,000 linear feet of water line, minimum 1 sample for each section disinfected, in properly sterilized containers.
- F. Repeat disinfection until 3 consecutive-day tests (second taken 24 hours after first and third taken 24 hours after second) indicate absence of coliform organisms.
- G. Bacterial examinations shall be made by a Texas Department of Health-certified laboratory.

END OF SECTION

SECTION 33 01 30.11 - TELEVISION INSPECTION OF SEWERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipeline flushing and cleaning.
 - 2. Television inspection of sewer pipelines.
 - 3. Audio-video recording of pipeline interior.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 01 50 00 "Temporary Facilities and Controls:" Safety requirements when bypassing sewage flow.
 - 3. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping:" Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 DEFINITIONS

- A. DVD: An optical disc storage format, offering higher storage capacity than compact discs (CDs) while having the same dimensions.

1.3 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Requirements for coordination.
- B. Coordinate Work of this Section with City of Midland Water Utilities.

1.4 SCHEDULING

- A. Section 01 32 16 "Construction Progress Schedule:" Requirements for scheduling.
- B. Furnish Work schedule for periods of time when sewer piping section is out of service for joint sealing.

1.5 SEQUENCING

- A. Section 01 10 00 "Summary:" Requirements for sequencing.
- B. Sequence Work in following order:
 - 1. Following substantial completion but before sewer has been placed in service.

1.6 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. DVDs:
 - 1. Submit three copies of completed narrated color DVDs identified by Project name, street name, right-of-way property name, and manhole numbers.
 - 2. DVDs become property of Owner and City of Midland.

- C. Inspection Logs:
 - 1. Submit cleaning and television inspection logs for each section of sewer line to be rehabilitated.
 - 2. Include following minimum information:
 - a. Stationing and location of lateral services, wyes, or tees.
 - b. Date and clock time references.
 - c. Pipe joints.
 - d. Infiltration/inflow defects.
 - e. Cracks.
 - f. Leaks.
 - g. Offset joints.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.7 QUALITY ASSURANCE

- A. Perform Work according to City of Midland standards.

PART 2 - PRODUCTS

2.1 DVDs

- A. Description: Digital video formatted discs.
- B. Audio track containing simultaneously recorded narrative commentary and evaluations of videographer, describing in detail condition of pipeline interior.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for application examination.
- B. Verify location of sewer pipelines to be inspected.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for application preparation.
- B. Flush and clean pipeline to remove sludge, dirt, sand, stone, grease, and other materials to ensure clear view of interior conditions.
- C. Debris:
 - 1. Intercept flushed debris at next downstream manhole using weir or screening device.
 - 2. Remove and dispose of debris off Site.

3.3 APPLICATION

- A. Closed-Circuit Television (CCTV) Camera System:
 - 1. Use cameras specifically designed and constructed for closed-circuit sewer line inspection.
 - 2. Use camera equipment with pan-and-tilt capability to view each lateral connection at multiple angles.
 - 3. Use camera capable of moving both upstream and downstream with minimum 1,000 feet horizontal distance within one setup and using direct-reading cable position meter.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- C. Pipeline Inspection:
 - 1. Audio-video record sections of sewer pipeline between designated manholes.
 - 2. Identify and record locations of flat grades, dips, deflected joints, open joints, broken pipe, protrusions into pipeline, and points of infiltration.
 - 3. Locate and record service connections.
 - 4. Record locations of pipeline defects, connection horizontal distance in feet, and direction from manholes.
 - 5. Video-record with pipe section plugged to view 100 percent of pipe ID.

END OF SECTION

SECTION 33 05 05.31 - HYDROSTATIC TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Hydrostatic testing of pressure piping.
- B. Related Requirements:
 - 1. Section 33 14 13 "Public Water Utility Distribution Piping:" Pipe materials and accessories normally encountered with pressurized water distribution systems.
 - 2. Section 33 14 17 "Site Water Utility Distribution Piping:" Pipe materials and accessories normally encountered with pressurized water distribution systems.

1.2 REFERENCE STANDARDS

- A. American Water Works Association:
 - 1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.3 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Submit following items prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of piping tests.

1.4 QUALITY ASSURANCE

- A. Perform Work according to City of Midland and TCEQ standards.

1.5 QUALIFICATIONS

- A. Applicator: Company specializing in performing Work of this Section with minimum 3 years' experience.

PART 2 - PRODUCTS

2.1 HYDROSTATIC TESTING

- A. Equipment:
 - 1. Pressure pump.
 - 2. Pressure hose.
 - 3. Water meter.
 - 4. Test connections.
 - 5. Pressure relief valve.
 - 6. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that piping is ready for testing.
- C. Verify that trenches are backfilled.
- D. Verify that pressure piping thrust restraints have been installed.

3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- C. Testing of Pressure Piping:
 - 1. Test system according to AWWA C600 and following:
 - a. Hydrostatically test each portion of pressure piping, including valved section, at 1.5 times working pressure of piping, based on elevation of lowest point in piping corrected to elevation of test gauge.
 - b. Conduct hydrostatic testing for at least 2 hours.
 - c. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
 - d. Install corporation cocks at high points.
 - e. Close air vents and corporation cocks after air is expelled.
 - f. Raise pressure to specified test pressure.
 - g. Observe joints, fittings, and valves undergoing testing.
 - h. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
 - i. Retest.
 - j. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
 - k. Maintain pressure within plus or minus 5.0 psi of test pressure.
 - l. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
 - m. Compute maximum allowable leakage using following formula:
 - 1) $L = [SD \times \text{sqrt}(P)]/C$.
 - 2) L = testing allowance, gph.
 - 3) S = length of pipe tested, feet.
 - 4) D = nominal diameter of pipe, inches.
 - 5) P = average test pressure during hydrostatic testing, psig.
 - 6) C = 148,000.
 - 7) If pipe undergoing testing contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each pipe size.

2. If testing of piping indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within acceptable limits.
3. Correct visible leaks regardless of quantity of leakage.

END OF SECTION

SECTION 33 05 05.36 - VACUUM TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Vacuum testing of manholes.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 33 05 76 "Fiberglass Manholes": Requirements for sewage and stormwater manholes.
 - 3. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping": Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.

1.3 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
- B. Submit following items prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of manhole tests.
- D. Qualifications Statement:
 - 1. Submit qualifications for applicator.

1.4 QUALITY ASSURANCE

- A. Perform Work according to City of Midland standards.

1.5 QUALIFICATIONS

- A. Applicator: Company specializing in performing Work of this Section with minimum 3 years' experience.

PART 2 - PRODUCTS

2.1 VACUUM TESTING

- A. Equipment:
 - 1. Vacuum pump.
 - 2. Vacuum line.

3. Vacuum Tester Base:
 - a. Compression band seal.
 - b. Outlet port.
4. Shutoff valve.
5. Stopwatch.
6. Plugs.
7. Vacuum Gage: Calibrated to 0.1 in. Hg.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that manholes are ready for testing.
- C. Verify that manholes are backfilled.

3.2 FIELD QUALITY CONTROL

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.
- B. Manhole Testing:
 1. Repair both outside and inside of joint to ensure permanent seal.
 2. Test manholes with manhole frame set in place.
 3. Vacuum Testing:
 - a. Comply with ASTM C1244.
 - b. Plug pipe openings; securely brace plugs and pipe.
 - c. Inflate compression band to create seal between vacuum base and structure.
 - d. Connect vacuum pump to outlet port with valve open, then draw vacuum to 10 in. Hg.
 - e. Close valve.
 - f. Manhole Test Duration in Seconds:
 - 1) Manhole Diameter of 4 Feet: 60.
 - 2) Manhole Diameter of 5 Feet: 75.
 - 3) Manhole Diameter of 6 Feet: 90.
 - g. Record vacuum drop during test period.
 - h. If vacuum drop is greater than 1 in. Hg during testing period, repair and retest manhole.
 - i. If vacuum drop of 1 in. Hg does not occur during test period, manhole is acceptable; discontinue testing.
 - j. If vacuum test fails to meet 1 in. Hg drop in specified time after repair, repair and retest manhole.

END OF SECTION

SECTION 33 05 05.41 - AIR TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Low-pressure air testing of gravity sewer piping.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping": Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
- B. Submit following items prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gage calibration.
- C. Test and Evaluation Reports: Indicate results of piping tests.
- D. Qualifications Statement:
 - 1. Submit qualifications for applicator.

1.3 QUALITY ASSURANCE

- A. Perform Work according to City of Midland standards.

1.4 QUALIFICATIONS

- A. Applicator: Company specializing in performing Work of this Section with minimum three years' experience.

PART 2 - PRODUCTS

2.1 AIR TESTING

- A. Equipment:
 - 1. Air compressor.
 - 2. Air supply line.
 - 3. Shutoff valves.
 - 4. Pressure regulator.
 - 5. Pressure relief valve.
 - 6. Stopwatch.
 - 7. Plugs.
 - 8. Pressure Gage: Calibrated to 0.1 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation examination.
- B. Verify that piping is ready for testing.
- C. Verify that trenches are backfilled.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for preparation.
- B. Lamping:
 - 1. Lamp gravity piping after flushing and cleaning.
 - 2. Perform lamping operation by shining light at one end of each pipe section between manholes.
 - 3. Observe light at other end.
 - 4. Pipe not installed with uniform line and grade will be rejected.
 - 5. Remove and reinstall rejected pipe sections.
 - 6. Clean and lamp until pipe section is installed to uniform line and grade.
- C. Plugs:
 - 1. Plug outlets, wye branches, and laterals.
 - 2. Brace plugs to resist test pressures.

END OF SECTION

SECTION 33 05 05.43 - MANDREL TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Deflection testing of plastic sewer piping.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping": Pipe materials, manholes, and accessories normally encountered with gravity sewerage piping.

1.2 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM D2122 - Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.

1.3 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
- B. Submit following items prior to start of testing:
 - 1. Testing procedures.
 - 2. List of test equipment.
 - 3. Testing sequence schedule.
 - 4. Provisions for disposal of flushing and test water.
 - 5. Certification of test gage calibration.
 - 6. Deflection mandrel drawings and calculations.

PART 2 - PRODUCTS

2.1 DEFLECTION TESTING

- A. Equipment:
 - 1. "Go, no go" mandrel.
 - 2. Pull/retrieval ropes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation examination.
- B. Verify that piping is ready for testing.
- C. Verify that trenches are backfilled.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for preparation.
- B. Lamping:
 - 1. Lamp gravity piping after flushing and cleaning.
 - 2. Perform lamping operation by shining light at one end of each pipe section between manholes.
 - 3. Observe light at other end.
 - 4. Pipe not installed with uniform line and grade will be rejected.
 - 5. Remove and reinstall rejected pipe sections.
 - 6. Clean and lamp until pipe section is installed to uniform line and grade.
- C. Plugs:
 - 1. Plug outlets, wye branches, and laterals.
 - 2. Brace plugs to resist test pressures.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements": Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements": Requirements for testing, adjusting, and balancing.
- C. Deflection Testing of Plastic Sewer Piping:
 - 1. Perform vertical ring deflection testing on PVC and ABS sewer piping after backfilling has been in place for at least 30 days, but not longer than 12 months.
 - 2. Allowable maximum deflection for installed plastic sewer pipe is no greater than 5 percent of original vertical internal diameter.
 - 3. Perform deflection testing using "go, no go" mandrel.

END OF SECTION

SECTION 33 05 07 - TRENCHLESS INSTALLATION OF UTILITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Casing and jacking pipe.
 - 2. Carrier pipe.
 - 3. Excavation for approach trenches and pits.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 33 14 13 "Public Water Utility Distribution Piping:" Piping and carrier pipe requirements.
 - 3. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping:" Piping and carrier pipe requirements.

1.2 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
 - 2. AASHTO M133 - Standard Specification for Preservatives and Pressure Treatment Processes for Timber.
 - 3. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Welding Society:
 - 1. AWS D1.1/ (D1.1M - Structural Welding Code α Steel).
- C. ASTM International:
 - 1. ASTM A36/A (36M - 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 A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 - 4. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
 - 5. ASTM A1011/ (A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength).
 - 6. ASTM C33/ (C33M - Standard Specification for Concrete Aggregates).
 - 7. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
 - 8. ASTM C150/ (C150M - Standard Specification for Portland Cement).
 - 9. ASTM C361 - Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.
 - 10. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
 - 11. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - 12. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³)).

13. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
 14. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- D. National Utility Contractors Association:
1. NUCA - Guide to Pipe Jacking and Microtunneling Design.

1.3 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Requirements for coordination.
- B. Coordinate Work of this Section with City of Midland, Texas Department of Transportation, and utilities within construction area.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding tunnel liner plate, showing sizes, shapes, methods of attachment, connection details, and details of grout holes.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- E. Submit emergency response procedures to handle situations when conduit is compromised and jeopardizes safety or integrity of installation.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
 1. Submit qualifications for installer and licensed professional.
 2. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for submittals.
- B. Project Record Documents: Record actual locations of casing or tunnel liner, carrier pipe, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work according to AREMA, and NUCA guidelines.
- B. Obtain occupancy permit when boring, jacking, or tunneling under or within rights-of-way of state and municipal highways and railroads.
- C. Perform Work according to City of Midland and Texas Department of Transportation standards.

1.7 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this Section with minimum 3 years' experience .
- B. Welders: AWS qualified within previous 12 months for employed weld types.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements:" Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Handling: Support casing and carrier pipes with nylon slings during handling.
- D. Storage:
 - 1. Store products according to manufacturer instructions.
 - 2. Use wooden shipping braces between layers of stacked pipe.
 - 3. Stack piping lengths no more than three layers high.
 - 4. Store field joint materials in original shipping containers.
- E. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide temporary end caps and closures on piping and fittings and maintain in place until installation.
 - 3. Protect piping systems from entry of foreign materials and water by installing temporary covers, completing sections of Work, and isolating parts of completed system.
 - 4. Provide additional protection according to manufacturer instructions.

1.9 AMBIENT CONDITIONS

- A. Section 01 50 00 "Temporary Facilities and Controls:" Requirements for ambient condition control facilities for product storage and installation.
- B. Storage Temperature: Maintain 60 to 85 degrees F.

1.10 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 CASING AND JACKING PIPE

- A. Manufacturers:
 - 1. Furnish materials according to Texas Department of Transportation standards.
- B. Steel Casing Pipe:
 - 1. Comply with ASTM A53/A53M.
 - 2. Minimum Yield Strength: 42,000 psi.
 - 3. Minimum Wall Thickness: 0.375-inch.
 - 4. Welded Joints:
 - a. Comply with AWS D1.1/D1.1M.
 - b. Full circumference.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation examination.
- B. Verify that connection to existing piping system, sizes, locations, and invert elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation preparation.
- B. Identify required lines, levels, contours, and datum locations.
- C. Existing Utilities:
 - 1. Notify utility company to coordinate crossings.
- D. Maintain access to existing facilities and other active installations requiring access.

3.3 INSTALLATION

- A. Dewatering:
 - 1. As specified in Section 31 23 16.13 "Trenching and Backfilling."
 - 2. Intercept and divert surface drainage precipitation and ground water away from excavation through use of dikes, curb walls, ditches, pipes, sumps, or other methods.
 - 3. Develop substantially dry subgrade for subsequent operations.
 - 4. Comply with requirements of local and state authorities for dewatering to any watercourse, prevention of stream degradation, and erosion and sediment control.
- B. Pits or Approach Trenches:
 - 1. Excavate approach trenches or pits according to installation plan as Site conditions require.
 - 2. Ensure that casing entrance faces as near perpendicular in alignment as conditions permit.
 - 3. Establish vertical entrance face at least 1 foot above top of casing.
 - 4. Install excavation supports as specified in Section 31 23 16.13 "Trenching and Backfilling."
- C. Casing Pipe:
 - 1. Boring:
 - a. Push pipe into ground with boring auger rotating within pipe to remove soil.
 - b. Do not advance cutting head ahead of casing pipe, except for distance necessary to permit cutting teeth to maintain clearance for pipe.
 - c. Arrange machine bore and cutting head to be removable from within pipe.
 - d. Arrange face of cutting head to provide barrier to free flow of soft material.
 - e. If unstable soil is encountered during boring, retract cutting head into casing to permit balance between pushing pressure and ratio of pipe advancement to quantity of soil.
 - f. Grout to fill voids if voids develop greater than OD of pipe by approximately 1 inch.
 - g. If boring is obstructed, relocate jack or tunnel as directed by Engineer.

2. Drilling and Jacking:
 - a. Use oil-field-type rock roller bit or plate bit made up of individual roller cutter units solidly welded to pipe.
 - b. Turned and push pipe for its entire length by drilling machine to give bit necessary cutting action.
 - c. Inject high-density slurry (oil field drilling mud) to head as cutter lubricant.
 - d. Inject slurry at rear of cutter units to prevent jetting action ahead of pipe.
- D. Pressure Grouting: Pressure-grout annular space between casing pipe and surrounding earth.
- E. Carrier Pipe:
 1. Clean, inspect, and handle pipe as specified in Section 33 31 11 "Public Sanitary Sewerage Gravity Piping".."
 2. Placement:
 - a. Place carrier pipe as specified in Section 33 31 11 "Public Sanitary Sewerage Gravity Piping".."
 - b. Prevent damage to pipe joints as carrier pipe is placed in casing.
 3. Supports:
 - a. Support pipeline within casing such that no external loads are transmitted to carrier pipe.
 - b. Attach supports to barrel of carrier pipe; do not rest carrier pipe on bells.
 4. Grout ends of casing to seal.

3.4 TOLERANCES

- A. Section 01 40 00 "Quality Requirements:" Requirements for tolerances.
- B. Excavation: Do not overcut excavation by more than 1 inch greater than OD of casing pipe.
- C. Casing Pipe Vertical and Horizontal Alignment: Plus or minus 3 inches prior to installation of carrier pipe.
- D. Pipe Bells: Minimum 1/2-inch clearance to casing.

3.5 FIELD QUALITY CONTROL

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for testing, adjusting, and balancing.
- B. Compaction Testing:
 1. Comply with ASTM D1557 and ASTM D698.
 2. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
 3. Testing Frequency: One per bore pit..

3.6 CLEANING

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for cleaning.
- B. Remove temporary facilities for casing installation and jacking operations as specified in Section 01 50 00 "Temporary Facilities and Controls."

3.7 PROTECTION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for protecting finished Work.
- B. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

END OF SECTION

SECTION 33 05 09.33 - THRUST RESTRAINT FOR UTILITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tied joint restraint system.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 31 23 16.13 "Trenching" for trenching requirements for Site utilities.
 - 3. Section 31 23 23 "Fill" for backfilling requirements for Site utilities.
 - 4. Section 33 14 13 "Public Water Utility Distribution Piping" for requirements for piping Work as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures" for Contract Sum/Price modification procedures.
- B. Tied Joint Restraint System:
 - 1. Basis of Measurement: Considered subsidiary to pipe/utility installation.
 - 2. Basis of Payment: Includes tied joint restraint system and accessories.

1.3 REFERENCE STANDARDS

- A. American Water Works Association:
 - 1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- B. ASME International:
 - 1. ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.
- C. ASTM International:
 - 1. ACI 304: Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 2. ACI 305R: Hot Weather Concreting.
 - 3. ACI 306R: Cold Weather Concreting.
 - 4. ACI 308: Standard Practice for Curing Concrete.
 - 5. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 6. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 7. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 8. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 9. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 10. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
 - 11. ASTM A588 - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
 - 12. ASTM C33 - Concrete Aggregates
 - 13. ASTM C94 - Ready-Mixed Concrete

14. ASTM C150 - Portland Cement
15. ASTM C260 - Air Entraining Admixtures for Concrete.
16. ASTM C494 - Chemicals Admixtures for Concrete.
17. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
18. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
19. ASTM F436 - Standard Specification for Hardened Steel Washers.

1.4 COORDINATION

- A. Section 01 30 00 "Administrative Requirements" for requirements for coordination.
- B. Coordinate Work of this Section with installation of fittings and joints that require restraint.

1.5 PREINSTALLATION MEETINGS

- A. Section 01 30 00 "Administrative Requirements" for requirements for preinstallation meeting.

1.6 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures" for requirements for submittals.
- B. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.
- C. Shop Drawings:
 1. Indicate restrained joint details and materials being used.
 2. Indicate restrained joint locations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Qualifications Statement:
 1. Submit qualifications for manufacturer and fabricator.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for submittals.
- B. Project Record Documents: Record actual locations of joint restraints.

1.8 QUALITY ASSURANCE

- A. Perform Work according to AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances and ACI 301 standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements" for requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on-site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Provide pressure pipeline with restrained joints at each bend, tee, and change in direction.

2.2 TIED JOINT RESTRAINT SYSTEMS

- A. Manufacturers:
- B. Internal Pipe Restraint Systems (Section 33 14 13 "Public Water Utility Distribution Piping").
 - 1. Bulldog Restraint System; S&B Technical Products
 - a. Eagle Loc 900 JM Eagle.
 - b. Spec-Loc Specified Fittings, LLC.
 - 2. Certa-Lok; CertainTeed.
- C. External Pipe Restraint Systems:
 - 1. EBAA Iron, Inc.
 - 2. Star Pipe Products.
 - 3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - 4. Furnish materials according to City of Midland standards.
- D. Tie Bolts:
 - 1. Mechanical and Flanged Joints on 4- to 12-Inch Pipe:
 - a. Size: 3/4-inch.
 - b. Comply with ASTM A588, Grade B.
 - c. Comply with ASTM A325, Type 3, except increase tensile strength of full-body threaded section to 40,000 lbs. minimum for 5/8-inch and 60,000 lbs. for 3/4-inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.
- E. Tie Nut:
 - 1. Description: Hex nut for each tie bolt and tie rods.
 - 2. Comply with ASTM A563 Grade C3.
 - 3. Finish: Zinc-plated.

- F. Tiepin:
 - 1. Bends and Hydrants: 3/4-inch round bar stock.
 - 2. Comply with ASME B1.1 and ASTM A588.
 - 3. Finish: Zinc-plated.
- G. Tie Coupling:
 - 1. Description: Extension of continuous-threaded rods.
 - 2. Provide with center stop to aid installation.
 - 3. Comply with ASTM A588.
 - 4. Finish: Zinc-plated.
- H. Tie Clamp:
 - 1. Description: Retainer clamp for ductile iron, asbestos-cement, and PVC push-on pipe.
 - 2. Location: In front of bell.
 - 3. Comply with ASTM A36, ASTM A307, Grade A, and ASTM A563, Grade A.
 - 4. Finish: Zinc-plated.
- I. Tie Rod:
 - 1. Description: Continuous-threaded rod for cutting to desired lengths.
 - 2. Comply with ASTM A588, Grade B, ASTM A325, Type 3, and ASME B1.1.
 - 3. Finish: Zinc-plated.
- J. Tie Bar:
 - 1. Description: Steel bar used to restrain push-in plugs.
 - 2. Comply with ASTM A36.
 - 3. Finish: Zinc-plated.
- K. Tie Washer:
 - 1. Description: Round flat washers.
 - 2. ASTM A588, ASTM F436, Type 1.
 - 3. Finish: Zinc-plated.

2.3 MATERIALS

- A. Steel:
 - 1. High-Strength Low-Alloy Steel: Comply with ASTM A588, heat treated.
 - 2. High-Strength Low-Alloy Steel: Comply with ASTM A588.
 - 3. Carbon Steel: Comply with ASTM A36.
- B. Concrete:
 - 1. Cement: ASTM C150, Type I - Normal, Type II - Moderate, Portland type. All cement shall be from the same manufacturer unless approved by Engineer.
 - 2. Fine and Coarse Aggregates: ASTM C33.
 - 3. Water: Clean and not detrimental to concrete.
- C. Concrete Mix:
 - 1. Mix and deliver concrete in accordance with ASTM C94, Alternative No. 2 and 3.
 - 2. Select proportions for normal weight concrete in accordance with ACI 301 Methods 1, 2, and 3.
 - 3. Provide concrete to the following criteria:
 - a. Compressive Strength (28 days): 3,000 psi.
 - b. Slump: 1 to 4 inches.
 - c. Use fly ash only when approved.
 - d. Minimum Water/Cement Ratio: Three sacks/yard.

2.4 FINISHES

- A. Zinc Plating:
 - 1. Factory applied.
 - 2. Comply with ASTM B633.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for installation examination.
- B. Verify that pipe and fittings are ready to receive Work.
- C. Field measure and verify conditions for installation of Work.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements" for requirements for installation preparation.
- B. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.
- C. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- D. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

3.3 INSTALLATION

- A. Utility Piping:
 - 1. According to AWWA C600.
 - 2. Install joint restraint system such that joints are mechanically locked together to prevent joint separation.
 - 3. Installation Standards: Install Work according to City of Midland standards.
- B. Placing Concrete:
 - 1. Place concrete in accordance with ACI 304.
 - 2. Notify Engineer minimum 24 hours prior to commencement of operations.
 - 3. Ensure reinforcement, inserts, embedded parts, formed joint fillers are not disturbed during concrete placement.
 - 4. Install vapor barrier under interior slabs-on-grade. Lap joints minimum 6 inches and seal watertight by taping edges and ends.
 - 5. Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 6 inches and seal watertight.
 - 6. Install joint fillers in accordance with manufacturer's instructions.
 - 7. Separate slabs on grade from vertical surfaces with 1/2-inch-thick joint filler.
 - 8. Extend joint filler from bottom of slab to within 1/4-inch of finished slab surface.
 - 9. Install joint devices in accordance with manufacturer's instructions.
 - 10. Install construction joint device in coordination with slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

11. Place concrete continuously between predetermined expansion, control, and construction joints.
 12. Do not interrupt successive placement; do not permit cold joints to occur.
 13. Place floor slabs in pattern indicated.
- C. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/4-inch in 10 feet.

3.4 TOLERANCES

- A. Section 01 40 00 "Quality Requirements" for requirements for tolerances.
- B. Torque 5/8-inch nuts on mating threaded fasteners from 45 to 60 ft.-lbf.
- C. Torque 3/4-inch nuts on mating threaded fasteners from 75 to 90 ft.-lbf.
- D. Torque 1-inch nuts from 100 to 120 ft.-lbf.

END OF SECTION

SECTION 33 05 63 - CONCRETE VAULTS AND CHAMBERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Precast concrete vaults and chambers.
 - 2. End walls.
 - 3. Pipe ends.
 - 4. Frames and covers.
 - 5. Access hatches.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 10 00 "Concrete Forming and Accessories:" Erection and bracing of forms.
 - 3. Section 03 20 00 "Concrete Reinforcing:" Reinforcing steel as required by this Section.
 - 4. Section 03 30 00 "Cast-in-Place Concrete:" Concrete type for concrete vault or chamber construction.
 - 5. Section 31 23 16.13 "Trenching" Excavating for vaults or chambers, and foundation slabs.
 - 6. Section 31 23 23 "Fill:" Backfilling after vault or chamber installation.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures:" Contract Sum/Price modification procedures.
- B. Precast Concrete Vaults:
 - 1. Basis of Measurement: By each complete structure.
 - 2. Basis of Payment: Includes excavating, concrete foundation slab, vault, concrete structure sections, cover frame and cover, to indicated depth, and forming and sealing inlets and outlets.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
 - 2. AASHTO M 306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.
- B. American Concrete Institute:
 - 1. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
- C. American Welding Society:
 - 1. AWS D1.1/D1.1M - Structural Welding Code - Steel.
 - 2. AWS D1.4/D1.4M - Structural Welding Code - Reinforced Steel.
- D. ASTM International:
 - 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 - 2. ASTM A48 - Standard Specification for Gray Iron Castings.

3. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
5. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
6. ASTM A767 - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
7. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
9. ASTM A884 - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
10. ASTM C877 - Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections.
11. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
12. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
13. ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
14. ASTM C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
15. ASTM C33 - Standard Specification for Concrete Aggregates.
16. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
17. ASTM C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
18. ASTM C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
19. ASTM C150 - Standard Specification for Portland Cement.
20. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
21. ASTM C192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
22. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
23. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
24. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
25. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
26. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
27. ASTM C494 - Standard Specification for Chemical Admixtures for Concrete.
28. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
29. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
30. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
31. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.

32. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
 33. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
 34. ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars.
 35. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
 36. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 37. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
 38. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 39. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
 40. ASTM C1504 - Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains.
- E. National Precast Concrete Association:
1. NPCA Plant Certification Program.
 2. NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- F. The Society for Protective Coatings:
1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

1.4 PREINSTALLATION MEETINGS

- A. Section 01 30 00 "Administrative Requirements:" Requirements for preinstallation meeting.
- B. Convene minimum one week prior to commencing Work of this Section.

1.5 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding frames and covers, component construction, features, configuration, dimensions, and similar installations.
- C. Shop Drawings:
 1. Indicate vault or chamber locations, elevations, sections, equipment supports, piping, conduit, sizes and elevations of penetrations, and design drawings and calculations sealed by a Professional Engineer licensed in the State of Texas.
 2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings and penetrations for each type, size, and configuration.
- D. Submit concrete mix design for each different mix.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.
- G. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for custom fabrications. Delegated Design Engineer shall be licensed as a Professional Engineer in the State of Texas.

- H. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- I. Source Quality-Control Submittals: Indicate results of shop factory tests and inspections.
- J. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- K. Qualifications Statements:
 - 1. Submit qualifications for manufacturer, installer, and licensed professional.
 - 2. Welders: Qualify procedures and personnel according to AWS D1.1/D1.1M.

1.6 QUALITY ASSURANCE

- A. Obtain precast concrete vaults and chambers from single source.
- B. Perform structural design according to ACI 318.
- C. Perform Work according to NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- D. Material and Fabrication:
 - 1. Other Structures: Comply with ASTM C913.
- E. Welding:
 - 1. Structural Steel: Comply with AWS D1.1/D1.1M.
 - 2. Reinforcing Steel: Comply with AWS D1.4/D1.4M.
- F. Perform Work according to City of Midland standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Certified by NPCA Plant Certification Program prior to, and during Work of this Section.
- B. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience:
 - 1. ParkUSA
 - 2. Capital Precast
 - 3. Oldcastle Infrastructure
 - 4. Vaughn Concrete Products, Inc.
 - 5. Jensen Precast
- C. Welders: AWS qualified within previous 12 months for employed weld types.
- D. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of Texas.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements:" Requirements for transporting, handling, storing, and protecting products.
- B. Concrete Products: Do not deliver products until concrete has cured seven days or has attained minimum 75 percent of specified 28-day compressive strength.
- C. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- D. Handling:
 - 1. Comply with manufacturer instructions for unloading, storing, and moving vaults or chambers.
 - 2. Lift vaults or chambers from designated lifting points.

- E. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store vaults and chambers to prevent damage to Owner's property or other public or private property.
 - 3. Repair property damaged from materials storage.
- F. Protection:
 - 1. Protect materials in clean location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

- A. Minimum Loading: Comply with ASTM C857 and ASTM C890.
- B. Roof Live Load, with Impact Loading:
 - 1. Heavy Traffic:
 - a. Comply with AASHTO HB-17; HS20-44.
 - b. Maximum Each Wheel: 16,000 lbf.

2.2 PRECAST CONCRETE VAULTS AND CHAMBERS

- A. Fabricator List:
 - 1. ParkUSA.
 - 2. Capital Precast.
 - 3. Oldcastle Infrastructue, Inc.
 - 4. Vaughn Concrete Products, Inc.
 - 5. Jensen Precast.
 - 6. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - 7. Furnish materials according to City of Midland and Texas Department of Transportation standards.
- B. Material of Construction: Reinforced precast concrete.

2.3 FRAMES AND COVERS

- A. Manufacturers:
 - 1. Bilco.
 - 2. EJ.
 - 3. Neenah Foundry Company.
 - 4. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - 5. Furnish materials according to City of Midland standards.

2.4 ACCESS HATCHES

- A. Manufacturers:
 - 1. Bilco Company (The).
 - 2. U.S.F. Fabrication.
 - 3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - 4. Furnish materials according to City of Midland standards.

2.5 MATERIALS

- A. Admixtures:
 - 1. Manufacturers:
 - a. Furnish materials according to City of Midland standards.

2.6 FABRICATION

- A. Comply with ACI 318 and NPCA Quality Control Manual for Precast and Prestressed Concrete Plants.
- B. Fabricate vaults, chambers, and openings to size and configuration as indicated on Drawings.
- C. Forms:
 - 1. Fabricate to provide uniform precast concrete units with consistent dimensions.
 - 2. Clean after each use.
- D. Reinforcing:
 - 1. Install reinforcement by tying or welding to make rigid assemblies.
 - 2. Position reinforcement to maintain minimum 1/2-inch cover.
 - 3. Secure reinforcement to prevent displacement while placing concrete.
- E. Position and secure embedded items to prevent displacement while placing concrete.
- F. Deposit concrete in forms and consolidate concrete without segregating aggregate.
- G. Provide initial curing by retaining moisture using one of following methods:
 - 1. Cover with PE sheets.
 - 2. Cover with burlap or other absorptive material and keep continually moist.
 - 3. Apply curing compound according to manufacturer instructions.
- H. Provide final curing according to manufacturer's standard.
- I. Remove forms without damaging concrete.

2.7 ACCESSORIES

- A. Bituminous Coating:
 - 1. Manufacturers:
 - a. Carboline Company; a subsidiary of RPM International.
 - b. Duron, Inc.
 - c. Laurence, C. R. Co., Inc.
 - d. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - e. Furnish materials according to City of Midland standards.

2.8 SOURCE QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for testing, inspection, and analysis.

- B. Testing:
 - 1. Perform following tests for each 150 cu. yd. of concrete placed with minimum one set of tests each week:
 - a. Slump: Comply with ASTM C143.
 - b. Compressive Strength: ASTM C31, ASTM C192, and ASTM C39.
 - c. Air Content: Comply with ASTM C231 or ASTM C173.
 - d. Unit Weight: Comply with ASTM C138.
 - 2. Make test results available to Engineer, Owner, or City of Midland upon request.
- C. Inspection:
 - 1. Visually inspect completed vaults and chambers for defects.
 - 2. Repair defects on surfaces exposed to view to achieve uniform appearance.
 - 3. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
 - 4. Repair major defects only if permitted by Engineer .
- D. Certificate of Compliance:
 - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify correct size and elevation of excavation.
- D. Verify that subgrade and bedding are is properly prepared, compacted, and ready to receive Work of this Section.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation preparation.
- B. Mark each vault or chamber by indentation or using waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe or duct sleeves required by other Sections.
- D. Do not install vault or chamber if Site conditions induce loads exceeding weight capacity of vault or chamber.
- E. Inspect vaults and chambers immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. According to ASTM C891.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- C. While lowering vaults or chambers into excavations and joining pipe to units, take precautions to ensure that interiors of pipeline and structure remain clean.

- D. Install vaults and chambers to elevation and alignment as indicated on Drawings.
- E. Excavating:
 - 1. Correct over-excavation with fine aggregate or lean concrete.
- F. Base and Alignment:
 - 1. Install vaults and chambers supported at proper grade and alignment on compacted crushed-stone bedding.
- G. Assembly of Multisection Structures:
 - 1. Lower each section into excavation.
 - 2. Clean joint surfaces.
 - 3. Install watertight joint seals according to manufacturer instructions using gasket joints, external sealing bands, preformed joint sealants, elastomeric joint sealants, or grout.
- H. Connections:
 - 1. Connect pipe to vault pipe stubouts and seal watertight.
- I. Cover and Access Hatch:
 - 1. Set level, without tipping, to adjacent finished grade.
- J. Backfill excavations for vaults and chambers as specified in Section 31 23 16.13 "Trenching."
- K. Installation Standards: Install Work according to City of Midland standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for testing, adjusting, and balancing.

3.5 ATTACHMENTS

- A. Pipe, Fittings, and Appurtenances as specified in Drawings:
 - 1. Shall be installed and secured at Fabrication Plant and shipped intact to job site.
 - 2. Backflow assembly will not be required. Exclude:
 - a. WATTS #77F 6" DIA. STRAINER.
 - b. WATTS #757 6" DIA. DCVA.

END OF SECTION

SECTION 33 05 76 - FIBERGLASS MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiberglass manholes.
 - 2. Bedding and cover materials.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 31 23 16.13 "Trenching:" Manhole installation.
 - 3. Section 31 23 23 "Fill."
 - 4. Section 33 05 05.36 "Vacuum Testing:" Testing requirements for manholes.
 - 5. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping:" Piping connections to manholes.

1.2 DEFINITIONS

- A. Bedding: Specialized material placed under manhole prior to installation and subsequent backfill operations.
- B. FRP: Fiberglass-reinforced plastic.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures:" Contract Sum/Price modification procedures.
- B. Fiberglass Manhole:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Includes excavation, bedding, manhole, backfill, concrete, anchor, cover frame and cover, to indicated depth, and forming and sealing pipe of inlets and outlets.

1.4 REFERENCE STANDARDS

- A. American Association of State Highway Transportation Officials:
 - 1. AASHTO HB-17 - Standard Specifications for Highway Bridges.
 - 2. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
 - 3. AASHTO M306 - Standard Specification for Drainage, Sewer, Utility, and Related Castings.
- B. ASTM International:
 - 1. ASTM A48 - Standard Specification for Gray Iron Castings.
 - 2. ASTM A536 - Standard Specification for Ductile Iron Castings.
 - 3. ASTM C581 - Practice for Determining Chemical Resistance of Chemical Thermosetting Resins Used in Glass-Fiber Reinforced Structures Intended for Liquid Service.
 - 4. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
 - 5. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics.

6. ASTM D2563 - Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
7. ASTM D3753 - Standard Specification for Glass-Fiber Reinforced Polyester Manholes and Wetwells.
8. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
9. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

1.5 COORDINATION

- A. Section 01 30 00 "Administrative Requirements:" Requirements for coordination.
- B. Coordinate Work of this Section with connection to municipal sewer utility service and trenching.

1.6 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Product Data: Submit manufacturer information for manhole covers, component construction, features, configuration, and dimensions .
- C. Shop Drawings:
 1. Indicate structure locations and elevations.
 2. Indicate sizes and elevations of piping, and penetrations.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statement:
 1. Submit qualifications for manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for submittals.
- B. Project Record Documents: Record actual locations of manholes and connections, and record invert elevations.

1.8 QUALITY ASSURANCE

- A. Perform Work according to City of Midland and Texas Department of Transportation standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements:" Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Handling: Comply with manhole manufacturer instructions for unloading, and moving precast manholes and drainage structures.
- D. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store manholes to prevent damage to Owner's property or other public or private property.
 - 3. Repair property damaged from materials storage.
- E. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Take precautions to prevent damage to interior or exterior surfaces when handling.
 - 3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.12 WARRANTY

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for warranties.
- B. Furnish one-year manufacturer's warranty for fiberglass manholes.

PART 2 - PRODUCTS

2.1 FIBERGLASS MANHOLES

- A. Manufacturers:
 - 1. L.F. Manufacturing, LLC.
 - 2. Containment Solutions, Inc.
 - 3. Virtual Polymer Compounds.
 - 4. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - 5. Furnish materials according to City of Midland standards.
- B. Description:
 - 1. Material: FRP resin.
 - 2. Nominal Outer Diameter: As indicated on Drawings.
- C. Performance and Design Criteria:
 - 1. Load Rating:
 - a. 16,000 lb.
 - b. Comply with ASTM D3753.
 - 2. Chemical Resistance: Comply with ASTM C581 and D3753.

3. Flexural Strength (Conic Section):
 - a. Hoop: 18,000 psi.
 - b. Axial: 5,000 psi.
 4. Flexural Strength (Cylindrical Section):
 - a. Hoop: 26,000 psi.
 - b. Axial: 4,500 psi.
 5. Compressive Strength:
 - a. Hoop: 18,000 psi.
 - b. Axial: 5,000 psi.
 - c. Comply with ASTM D695.
- D. Surfaces:
1. Paint or other coatings will not be accepted.
 2. Exterior: Free of blisters larger than 1/2-inch in diameter, delamination, and exposed fibers.
 3. Interior: Resin-rich with no exposed fibers, crazing, delamination, blisters larger than 1/2-inch in diameter, and wrinkles greater than 1/4-inch in depth.
- E. Bottom (as indicated on Drawings):
1. Material: Match type and grade as used in fiberglass manhole.
 2. Furnish integral 3-inch-wide anchoring flange.
 3. Invert and Bench: Factory installed, using noncorrosive materials encapsulated in minimum 1/4-inch-thick fiberglass.
- F. Connections (as indicated on Drawings):
1. PVC sewer plain-end pipe attached to manhole with resin and glass-fiber-reinforced layup.
 2. Pipe: Match sewer pipe.
 3. Resin and Fiberglass Layup: Match type and grade as used in fiberglass manhole.
 4. Boots: Comply with ASTM C923.

2.2 FRAMES AND COVERS

- A. Manufacturers:
1. East Jordan Iron Works
 2. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 3. Furnish materials according to City of Midland standards.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that items provided by other Sections of Work are properly sized and located.
- C. Verify that built-in items are in proper location and are ready for roughing into Work.
- D. Verify correct size of manhole and structure excavation.
- E. Verify that excavation base is ready to receive Work and excavations and that dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation preparation.
- B. Mark each manhole with waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers as indicated on Drawings to indicate its intended use.
- C. Coordinate placement of inlet and outlet pipe as required by other Sections.
- D. Do not install manholes where Site conditions induce loads exceeding structural capacity of manholes or structures.
- E. Inspect manholes immediately prior to placement in excavation to verify that they are internally clean and free from damage; remove and replace damaged units.

3.3 INSTALLATION

- A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface structures or utilities in immediate or adjacent areas.
- B. Correct over-excavation with fine aggregate lean concrete or grade rings as indicated on Drawings.
- C. Remove large stones or other hard matter impeding consistent backfilling or compaction.
- D. Protect manhole from damage or displacement while backfilling operation is in progress.
- E. Excavating:
 - 1. As specified in Section 31 23 16.13 "Trenching," and in indicated locations and depths.
 - 2. Provide clearance around sidewalls of manhole for construction operations .
 - 3. If ground water is encountered, prevent accumulation of water in excavations; place manhole in dry trench.
 - 4. Where possibility exists of watertight manhole becoming buoyant in flooded excavation, anchor manhole to avoid flotation as approved by Engineer.
- F. Base and Alignment: Place foundation slab and trowel top surface level.
- G. Base and Alignment: Install manholes supported at proper grade and alignment support system as indicated on Drawings.
- H. Bedding:
 - 1. Place bedding material at trench bottom, and level materials in continuous layer not exceeding 8 inches.
 - 2. Compact bedding material to 95 percent maximum density.
 - 3. Maintain optimum moisture content of bedding material to attain required compaction density.
- I. Base Pad:
 - 1. Form and place cast-in-place concrete base pad with provision for sewer pipe end sections.
 - 2. Place manholes plumb and level and anchor to foundation slab.
- J. Attachments:
 - 1. Set cover frames and covers level to correct elevations without tipping.
- K. Backfilling: As specified in Section 31 23 23 "Fill."
- L. Installation Standards: Install Work according to City of Midland standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Perform testing on manholes according to City of Midland and TCEQ standards.
- C. Perform testing on manholes as specified in Section 33 05 05.36 "Vacuum Testing."

- D. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

END OF SECTION

SECTION 33 05 97 - IDENTIFICATION AND SIGNAGE FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic ribbon tape for placement above direct-buried utility.
 - 2. Trace wire for placement above direct-buried utility.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 31 23 16.13 "Trenching": Backfilling considerations for installation of underground pipe markers.
 - 3. Section 31 23 23 "Fill": Backfilling considerations for installation of underground pipe markers.
 - 4. Section 33 14 13 "Public Water Utility Distribution Piping": Piping, valves, and appurtenances requiring identification marking.
 - 5. Section 33 31 11 "Public Sanitary Sewerage Gravity Piping": Piping, valves, and appurtenances requiring identification marking.

1.2 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
- B. Product Data: Submit manufacturer catalog information for each specified product.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Qualifications Statement:
 - 1. Submit qualifications for manufacturer.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for submittals.
- B. Project Record Documents: Record actual locations of tagged valves.

1.4 QUALITY ASSURANCE

- A. Perform Work according to City of Midland and Texas Department of Transportation standards.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

PART 2 - PRODUCTS

2.1 UTILITY MARKERS

- A. Manufacturers:
 - 1. Global Equipment Company, Inc.

2. Berntsen International Inc.
3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
4. Furnish materials according to City of Midland, TCEQ, and Texas Department of Transportation standards.

2.2 BURIED UTILITY RIBBON TAPE

- A. Manufacturers:
1. SETON
 2. PRESCO.
 3. ULINE.
 4. Berntsen International Inc.
 5. Pipemarket.com; Brimar Industries, Inc.
 6. Substitutions: As specified in Section 01 60 00 "Product Requirements."

2.3 TRACE WIRE

- A. Manufacturers:
1. Northtown Company.
 2. Priority Wire and Cable, Inc.
 3. TracerWire.
 4. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 5. Furnish materials according to City of Midland, TCEQ, and Texas Department of Transportation standards.
 6. Description:
 - a. Conductor: Copper or Copper Clad.
 - b. Covering: Brightly colored plastic, imprinted with size and utility type in large letters.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Pipeline Marker Posts, Utility Markers, and Marking Flags: According to manufacturer instructions.
- B. Ribbon Tape and Trace Wire:
1. Continuous per City of Midland standards and specifications..
 2. Coordinate with trench Work as specified in Section 31 23 16.13 Trenching," 31 23 23 "Fill."
- C. Installation Standards: Install Work according to City of Midland and TCEQ standards.

END OF SECTION

SECTION 33 14 13 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for public water line, including any potable water line and fire water line and accessories.
 - 2. Tapping sleeves and valves.
 - 3. Positive-displacement meters.
 - 4. Pipe support systems.
 - 5. Bedding and cover materials.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this section.
 - 2. Section 03 30 00 "Cast-in-Place Concrete" for concrete for cradles and encasements.
 - 3. Section 31 23 16.13 "Trenching" for excavation as required by this Section.
 - 4. Section 31 23 23 "Fill" for requirements for backfill to be placed by this Section.
 - 5. Section 33 01 10.58 "Disinfection of Water Utility Piping Systems" for disinfection of water mains and appurtenances.
 - 6. Section 33 05 07 "Trenchless Installation of Utility Piping" for waterline installation under roadways and other obstructions.
 - 7. Section 33 05 09.33 "Thrust Restraint for Utility Piping" for tied-joint restraint system to anchor and resist forces developed in underground closed pipeline systems.
 - 8. Section 33 05 63 "Concrete Vaults and Chambers" for cast-in-place, precast-concrete, or masonry structures for access to subsurface drainage piping or utilities.
 - 9. Section 33 05 97 "Identification and Signage for Utilities" for pipe markers.
 - 10. Section 33 14 17 "Site Water Service Utility Laterals" for water main service connections.
 - 11. Section 40 05 78.13 "Air/Vacuum Valves for Water Service" for air/vacuum release valves at pipeline high points.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures" for Contract Sum/Price modification procedures.
- B. Pipe and Fittings:
 - 1. Basis of Measurement Pipe: By linear foot.
 - 2. Basis of Measurement Fittings: By ton.
 - 3. Basis of Payment: Includes excavation and backfill; pipe, fittings, and appurtenances; bedding; thrust restraints; connection to Site service piping; connection to municipal utility water source; and installation of accessories.
- C. Valves:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Includes excavation, bedding, backfill, valve, fittings, boxes, extension stems, and accessories.
- D. Fire Hydrants:
 - 1. Basis of Measurement: By each.

2. Basis of Payment: Includes excavation, gravel sump, bedding, backfill, hydrant, valve, valve box, extension stem, connection, and accessories.
- E. Meters:
 1. Basis of Measurement: By each.
 2. Basis of Payment: Includes meter, fittings, meter vault, and accessories.
- F. Tapping Sleeves:
 1. Basis of Measurement: By each.
 2. Basis of Payment: Includes tapping sleeve, tapping valves, and accessories.
- G. Service Connections:
 1. Basis of Measurement: By each.
 2. Basis of Payment: Includes Polyethylene (PE) Tubing, service saddles, corporation stops, copper meter setters, and meter boxes.
- H. Large Service Connections:
 1. Basis of Measurement: By each.
 2. Basis of Payment: Includes PVC pipe, precast concrete vault, bypass line, and fittings.
- I. Warning Tape and Trace Wire:
 1. Basis of Measurement: By linear foot
 2. Basis of Payment: Includes magnetic warning tape and copper trace wire.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society of Mechanical Engineers:
 1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
- C. ASTM International:
 1. ASTM A36 - Standard Specification for Carbon Structural Steel.
 2. ASTM A123.
 3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³).
 5. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
 6. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 7. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 8. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 9. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
 10. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
 11. ASTM A377 - Standard Index of Specifications for Ductile Iron Pressure Pipe.
 12. ASTM D2737 - Standard Specification for Polyethylene (PE) Plastic Tubing.
 13. ASTM A536 - Standard Specification for Ductile Iron Castings.
- D. American Water Works Association:
 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
 3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
 4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
 7. AWWA C153 - Ductile-Iron Compact Fittings.
 8. AWWA C200 - Steel Water Pipe, 6 In. and Larger.
 9. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe.
 10. AWWA C205 - Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. and Larger - Shop Applied.
 11. AWWA C206 - Field Welding of Steel Water Pipe.
 12. AWWA C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 In. Through 144 In.
 13. AWWA C208 - Dimensions for Fabricated Steel Water Pipe Fittings.
 14. AWWA C213 - Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
 15. AWWA C300 - Reinforced Concrete Pressure Pipe, Steel-Cylinder Type.
 16. AWWA C301 - Prestressed Concrete Pressure Pipe, Steel-Cylinder Type.
 17. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
 18. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
 19. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
 20. AWWA C606 - Grooved and Shouldered Joints.
 21. AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.
 22. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
 23. AWWA C702 - Cold-Water Meters - Compound Type.
 24. AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.
 25. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-In. Through 12-In., for Water Transmission and Distribution.
 26. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2-In. through 3-In., for Water Service.
 27. AWWA C906 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In., for Water Transmission and Distribution.
 28. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.
 29. AWWA B300 α Hypochlorites.
 30. AWWA M23 α PVC Pipe α Design and Installation.
 31. AWWA C502 α Dry-Barrel Fire Hydrants.
 32. AWWA C509 α Resilient-Seated Gate Valves for Water Supply Service
 33. AWWA C651 - Disinfecting Water Mains.
 34. AWWA C655 - Field Dechlorination.
 35. AWWA C800 - Underground Service Line Valves and Fittings.
- E. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.
- F. National Fire Protection Association:
1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
- G. American National Standards Institute/National Sanitation Foundation ANSI/NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
 2. NSF 372 - Drinking Water System Components - Lead Content.
- H. Texas Commission on Environmental Quality – 30 TAC Chapter 290 Subchapter D Rules and Regulations for Public Water Systems.

1.4 COORDINATION

- A. Section 01 30 00 "Administrative Requirements" for coordination.

1.5 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures" for submittals.
- B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, hydrants, and miscellaneous accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- E. Preconstruction Photographs: Submit digital files of color photographs of Work areas and material storage areas, as specified in Section 01 70 00 "Execution and Closeout Requirements."
- F. Qualifications Statements:
1. Submit qualifications for manufacturer and installer.

1.6 SOURCE QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements" for testing, inspection, and analysis.
- B. Provide shop inspection and testing of pipe.
- C. Certificate of Compliance:
1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
 2. Specified shop tests are not required for Work performed by approved manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements" for submittals.
- B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations, hard copy.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

- A. Valves: Mark valve body with manufacturer's name and pressure rating.
- B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
- C. Perform Work according to City of Midland, TCEQ and Texas Department of Transportation standards set forth in Section 1.3 and, if applicable, municipal standards adopted by the Owner.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years' documented experience.
- B. Installer: Company specializing in performing Work of this Section with minimum 3 years' documented experience in installation of similar pipe and materials.[specifier to determine requirement]

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements" for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
 - 4. Store PE and PVC materials out of sunlight. [specifier to determine] (dependent on construction time)
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas. [specifier to determine storage requirement]
 - 2. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication. [specifier to determine requirement]
 - 2. Indicate field measurements on Shop Drawings. [specifier to determine requirement]

1.12 WARRANTY

- A. Section 01 70 00 "Execution and Closeout Requirements" for warranties.
- B. Furnish 1-year manufacturer's warranty for valves, pipe, and fittings.

PART 2 - PRODUCTS

2.1 WATER PIPING

- A. Ductile-Iron Pipe:
 - 1. Comply with AWWA C151.
 - 2. Bituminous Outside Coating: Comply with AWWA C151.
 - 3. Pipe Mortar Lining:
 - a. Comply with AWWA C104.
 - b. Thickness: Double.
 - 4. Pipe Class:
 - a. Comply with AWWA C151.
 - b. Thickness Class 54, unless otherwise noted on the Drawings.

5. Fittings:
 - a. Material: Ductile G Iron; comply with AWWA C110.
 - b. Compact Fittings: Ductile-Iron; comply with AWWA C153.
 - c. Coating and Lining:
 - 1) Bituminous Coating: Comply with AWWA C110.
 - 2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.
 - d. Pressure Class: 250
 - e. ASME B16.1 Class: 300
 6. Joints:
 - a. Mechanical and Push-on Joints: Comply with AWWA C111.
 - b. Flanged Joints: Comply with AWWA C115. ASME B16.1.
 7. Manufacturers:
 - a. American.
 - b. U.S. Pipe.
 - c. Tyler Pipe.
 - d. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- B. PVC:
1. Comply with AWWA C900, Class 235, DR18, unless otherwise noted on the Drawings.
 2. Fittings: Comply with AWWA C111.
 3. Joints:
 - a. Comply with ASTM D3139 and F477.
 - b. Seals: PVC flexible elastomeric.
 - c. Solvent-cement couplings are not permitted.

2.2 VALVES AND FIRE HYDRANTS

- A. As specified in Section 33 14 19 "Valves and Hydrants for Water Utility Service."

2.3 POSITIVE DISPLACEMENT METERS

- A. Manufacturers:
 1. Furnish materials according to City of Midland, TCEQ, and AWWA M6 standards.

2.4 CONCRETE ENCASUREMENT AND CRADLES

- A. Concrete:
 1. As specified in Section 03 30 00 "Cast-in-Place Concrete."
 2. Compressive Strength: 4,000 psi at 28 days.
 3. Finish: Rough troweled.
- B. Concrete Reinforcement: As specified in Section 03 20 00 "Concrete Reinforcing."

2.5 MATERIALS

- A. Bedding and Cover:
 1. Bedding: Fill as specified in Section 31 23 23 Fill."
 2. Cover: Fill as specified in Section 31 23 16.13 "Trenching."
 3. Soil Backfill from above Pipe to Finish Grade as specified in Section 31 23 16.13 "Trenching."

2.6 ACCESSORIES

- A. Thrust Restraints: As specified in Section 33 05 09.33 "Thrust Restraint for Utility Piping."
- B. Air/Vacuum Release Valves:
 - 1. As located on Drawings.
 - 2. As specified in Section 40 05 78.13 "Air/Vacuum Valves for Water Service."
- C. Pipe Markers: As specified in Section 33 05 97 "Identification and Signage for Utilities."
- D. Vaults: As specified in Section 33 05 63 "Concrete Vaults and Chambers."

2.7 SOURCE QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements" for requirements for testing, inspection, and analysis.
- B. Provide shop inspection and testing of pipe.
- C. Certificate of Compliance:
 - 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements" for installation examination.
- B. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements" for installation preparation.
- B. Preconstruction Site Photos:
 - 1. As specified in Section 01 70 00 "Execution and Closeout Requirements."
 - 2. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench. May provide a digital video in acceptable format in lieu of individual photos.
 - 3. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.
 - 4. Include Project description, date taken, and sequential number on back of each photograph.
- C. Pipe Cutting:
 - 1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
 - 2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
 - 3. Grind edges smooth with beveled end for push-on connections.
- D. Remove scale and dirt on inside and outside before assembly.
- E. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. As specified in Section 31 23 16.13 "Trenching and Backfilling."
- B. Hand trim for accurate placement of pipe to elevations as indicated on Drawings.
 - 1. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
- C. Piping:
 - 1. Comply with AWWA C600 or C605, as applicable. [Note C600 DI Pipe and fittings, C605 PVC Pipe and fittings]
 - 2. Handle and assemble pipe according to manufacturer instructions and as indicated on Drawings.
 - 3. Maintain horizontal and vertical separation between water main and sewer in accordance with current TCEQ regulations.
 - 4. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
 - 5. Grooved and Shouldered Pipe Joints: Comply with AWWA C606.
 - 6. Route pipe in a straight line and re-lay pipe that is out of alignment or grade.
 - 7. High Points:
 - a. If field conditions arise that necessitate high points, install air-release valves as specified in Section 40 05 78.13 "Air/Vacuum Valves for Water Service," as indicated on Drawings and as directed by Engineer.
 - 8. Bearing:
 - a. Maintain bearing along entire length of pipe.
 - b. Excavate bell holes to permit proper joint installation.
 - c. Do not lay pipe in wet or frozen trench.
 - 9. Prevent foreign material from entering pipe during placement.
 - 10. Allow for expansion and contraction without stressing pipe or joints.
 - 11. Close pipe openings with watertight plugs during Work stoppages.
 - 12. Install access fittings to permit disinfection of water system performed under Section 33 01 10.58 "Disinfection of Water Utility Piping Systems."
 - 13. Cover:
 - a. Establish elevations of buried piping with not less than 3 feet of cover, unless otherwise shown on the Drawings.
 - b. Measure depth of cover:
 - 1) Landscape areas: From final surface grade to top of pipe barrel.
 - 2) Concrete or Paved Areas: From subgrade to top of barrel.
 - 14. Pipe Markers: As specified in Section 33 05 97 "Identification and Signage for Utilities."
- D. Valves and Hydrants: As specified in Section 33 14 19 "Valves and Hydrants for Water Utility Service."
- E. Tapping Sleeves and Valves: As indicated on Drawings and according to City of Midland and manufacturer instructions.
- F. Thrust Restraints: As specified in Section 33 05 09.33 "Thrust Restraint for Utility Piping."
- G. Service Connections: As specified in Section 33 14 17 "Site Water Service Utility Laterals."
- H. Backfilling: Backfill around sides and to top of pipe as specified in Section 31 23 23 "Fill."

- I. Disinfection of Potable Water Piping Systems: As specified in Section 33 01 10.58 Disinfection of Water Utility Piping Systems."
- J. Installation Standards: Install Work according to City of Midland, TCEQ, and Texas Department of Transportation standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements" for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements" for testing, adjusting, and balancing.
 - 1. Perform pressure test on piping according to City of Midland, TCEQ, and Section 33 05 05.31 "Hydrostatic Testing" standards.
- C. Compaction Testing:
 - 1. Comply with compaction method on plans and/or specified in Section 31 23 16.13 "Trenching"

END OF SECTION

SECTION 33 14 17 - SITE WATER SERVICE UTILITY LATERALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pipe and fittings for 2-inch water service connections to buildings.
 - 2. Corporation stop assemblies.
 - 3. Curb stop assemblies.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 31 23 16.13 "Trenching:" Excavation of pipe trench.
 - 3. Section 31 23 23 - Fill: Backfilling of trench.
 - 4. Section 33 01 10.58 "Disinfection of Water Utility Piping Systems:" Flushing and disinfecting of water system.
 - 5. Section 33 05 09.33 "Thrust Restraint for Utility Piping:" Thrust restraints as required by this Section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures:" Contract Sum/Price modification procedures.
- B. Pipe and Fittings:
 - 1. Basis of Measurement: By linear foot.
 - 2. Basis of Payment: Includes hand-trimming excavation, pipe, corporation stop and fittings, bedding, thrust restraints, connection to building service piping, and municipal utility water source.

1.3 REFERENCE STANDARDS

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Society of Mechanical Engineers:
 - 1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
 - 2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- C. American Society of Sanitary Engineering:
 - 1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
 - 2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.
- D. ASTM International:
 - 1. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
 - 2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
 - 3. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric).
 - 4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).

5. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
 6. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 7. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 8. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 9. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
 10. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- E. American Welding Society:
1. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding.
- F. American Water Works Association:
1. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
 2. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
 3. AWWA C800 - Underground Service Line Valves and Fittings.
 4. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In., for Water Service.
 5. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures:" Requirements for submittals.
- B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventers, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Qualifications Statement:
 1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, pressure-pipe centerline elevations, and gravity-pipe invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

- A. Perform Work according to TCEQ standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements:" Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 WATER PIPING AND FITTINGS

- A. PVC Pipe:
 - 1. Comply with ASTM D1785, Schedule 40.
 - 2. Fittings: PVC; ASTM D2466.
 - 3. Joints: Solvent welded; ASTM D2855.

2.2 ACCESSORIES

- A. Thrust Restraints: As specified in Section 33 05 09.33 "Thrust Restraint for Utility Piping."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation examination.
- B. Verify that building service connections and municipal utility water main sizes, locations, and inverts are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements:" Requirements for installation preparation.
- B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
- C. Remove scale and dirt from inside and outside of piping before assembly.
- D. Prepare pipe connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench as specified in Section 31 23 16.13 "Trenching."
- B. Pipe and Fittings:
 - 1. Maintain separation of water main from sewer piping according to City of Midland and TCEQ code.

2. Group piping with other Site piping Work whenever practical.
 3. Install pipe to allow for expansion and contraction without stressing pipe or joints.
 4. Install access fittings to permit disinfection of water system.
 5. Thrust Restraints: Form and place concrete for thrust restraints at each elbow or change of direction of pipe.
 6. Establish elevations of buried piping with not less than 2 feet of cover.
 7. Backfill trench as specified in Section 31 23 23 "Fill."
 8. Installation Standards: Install Work according to City of Midland and TCEQ standards.
- C. Service Connections:
1. Install water service according to as indicated on Drawings.
 2. Install water service to within 5 feet of building and connect to building water service.
- D. Disinfection of Water Piping System: Flush and disinfect system as specified in Section 33 01 10.58 "Disinfection of Water Utility Piping Systems."
- E. Installation Standards: Install Work according to City of Midland and TCEQ standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements:" Requirements for inspecting and testing.
- B. Perform pressure test on water distribution system according to City of Midland and TCEQ standards.

END OF SECTION

SECTION 33 14 19 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Valves.
 - 2. Valve boxes.
 - 3. Fire hydrants.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 30 00 "Cast-in-Place Concrete," for thrust restraints.
 - 3. Section 33 01 10.58 "Disinfection of Water Utility Piping Systems," flushing and disinfecting requirements.
 - 4. Section 33 05 09.33 "Thrust Restraint for Utility Piping."
 - 5. Section 33 14 13 "Public Water Utility Distribution Piping," pressure testing valves and hydrants.
 - 6. Section 33 14 17 "Site Water Service Utility Laterals," piping, trenching, backfilling, and compaction requirements.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures," for Contract Sum/Price modification procedures.
- B. Valves:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Complete in place, to include excavation, valve, valve box, accessories, bedding, backfill, equipment, and incidentals.
- C. Fire Hydrants:
 - 1. Basis of Measurement: By each.
 - 2. Basis of Payment: Complete in place, to include excavation, hydrant, isolation valve and box, accessories, foundation bedding, backfill, equipment, and incidentals.

1.3 REFERENCE STANDARDS

- A. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- B. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
- C. AWWA C153 - Ductile-Iron Compact Fittings.
- D. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
- E. AWWA C502 - Dry-Barrel Fire Hydrants.
- F. AWWA C503 - Wet-Barrel Fire Hydrants.
- G. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
- H. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.
- I. MSS SP60 - Connecting Flange Joints Between Tapping Sleeves and Tapping Valves.
- J. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.
- K. NSF 61 - Drinking Water System Components - Health Effects.
- L. NSF 372 - Drinking Water System Components - Lead Content

1.4 COORDINATION

- A. Section 01 30 00 "Administrative Requirements."
- B. Coordinate Work of this Section with installation of water mains.

1.5 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures," for submittal requirements.
- B. Product Data: Submit manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
- E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- G. Qualifications Statements:
 - 1. Submit qualifications for manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements."
- B. Project Record Documents: Record actual locations of valves and hydrants.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements."

1.8 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
- B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.
- C. Perform Work according to City of Midland and TCEQ standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified herein with minimum 3 years' documented experience.
- B. Installer: Company specializing in performing Work herein with minimum 3 years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements," for transporting, handling, storing, and protecting products.
- B. Delivery:
 - 1. Seal valve and hydrant ends to prevent entry of foreign matter.
 - 2. Inspection: Accept materials on Site in manufacturer-original packaging and inspect for damage.

- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 VALVES

- A. Performance and Design Criteria:
 - 1. Pressure Rating:
 - a. 12-inch Diameter and Smaller: 200 psig.
 - b. 14-inch Diameter and Larger: 150 psig.
 - 2. End Connections: Flanged, mechanical joint, bell, as shown on Drawings.
 - 3. Furnish valves of diameters 16 inches and larger diameters with gear operators.
 - 4. Coatings:
 - a. Comply with AWWA C550.
 - b. Application: Interior and exterior.
- B. Resilient-Wedge Gate Valves:
 - 1. Manufacturers:
 - a. Clow Valve Company.
 - b. Mueller Co.
 - c. M & H.
 - d. Substitutions: As specified in Section 01 60 00 "Product Requirements."
 - e. Furnish materials according to City of Midland and TCEQ standards.
 - 2. Description:
 - a. Comply with AWWA C509.
 - b. Body: Ductile iron.
 - c. Seats: Resilient.
 - d. Stem:
 - 1) Type: Non-rising.
 - 2) Material: Bronze.
 - e. Operation:
 - 1) Square operating nut, 2 inches.
 - 2) Opening Direction: Counterclockwise.
- C. Tapping Sleeves and Valves:
 - 1. Tapping Valves: Shall meet requirements of gate valve Specifications, with the exception that one side shall be flanged to fit tapping sleeve with provisions for attaching a standard tapping machine to other side.
 - 2. Tapping Sleeves:
 - a. Furnish materials according to City of Midland and TCEQ standards.

2.2 FIRE HYDRANTS

- A. Manufacturers:
 - 1. Furnish materials according to City of Midland and TCEQ standards.

2.3 VALVE BOXES

- A. Manufacturers:
 - 1. Furnish materials according to City of Midland and TCEQ standards.

2.4 ACCESSORIES

- A. Thrust Restraints: As specified in Section 33 05 09.33 "Thrust Restraint for Utility Piping."
- B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.
- C. Valve Extension Stem: Furnished on buried valves where top of operating nut is more than 36 inches below finished grade. Top of extension stem may not be more than 9 inches below top of valve box.
- D. Fire Hydrant Drainage Gravel: As specified in Section 31 23 16.13 "Trenching," ASTM D2487, Class I or II Soil (USCS).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements," for installation.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify that elevations of existing facilities prior to excavation and installation of valves and hydrants are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements," for installation.
- B. Do not interrupt existing utilities without permission nor without arranging to provide temporary utility services.
 - 1. Notify Engineer no less than 7 days in advance of proposed utility interruption.
 - 2. Do not proceed without written permission from Engineer.

3.3 INSTALLATION

- A. Perform trench excavation, backfilling, and compaction as specified in Section 31 23 16.13 "Trenching," and Section 31 23 23 "Fill."
- B. Install valves and hydrants in conjunction with pipe laying. Restrain all joints and install concrete thrust blocks.
- C. Provide buried valves with valve boxes installed flush with finished grade.
- D. Provide support blocking and drainage gravel while installing fire hydrants. Do not block drain hole.
- E. Orientation:
 - 1. Set valves and hydrants plumb.
 - 2. Set fire hydrants with pumper nozzle facing roadway.
 - 3. Set fire hydrants with centerline of pumper nozzle 18 inches above finished grade and with safety flange not more than 6 inches nor less than 2 inches above grade.

- F. After main-line pressure testing, flush fire hydrants and check for proper drainage.
- G. Installation Standards: Install Work according to City of Midland and TCEQ
- H. standards.
- I. Disinfection of Water Piping System: Flush and disinfect valves and hydrants with water mains as specified in Section 33 01 10.58 "Disinfection of Water Utility Piping Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing: Pressure test valves and hydrants with water mains as specified in Section 33 14 13 "Public Water Utility Distribution Piping."

END OF SECTION

SECTION 33 31 11 - PUBLIC SANITARY SEWERAGE GRAVITY PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sanitary sewerage piping.
 - 2. Connection to existing manholes.
 - 3. Wye branches and tees.
 - 4. Sanitary laterals.
 - 5. Bedding and cover materials.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.
 - 2. Section 03 20 00 "Concrete Reinforcing."
 - 3. Section 03 30 00 "Cast-in-Place Concrete."
 - 4. Section 31 23 16.13 "Trenching," excavation requirements for trenching required herein.
 - 5. Section 33 05 05.36 "Vacuum Testing," execution requirements for vacuum testing of manholes.
 - 6. Section 33 05 05.41 "Air Testing," execution of air testing for sewerage piping.
 - 7. Section 31 23 23 "Fill, • • " requirements for backfilling as required herein.
 - 8. Section 33 05 05.43 "Mandrel Testing," plastic sewerage piping deflection testing.
 - 9. Section 33 05 76 "Fiberglass Manholes," for sanitary sewerage piping.
 - 10. Section 33 05 97 "Identification and Signage for Utilities," for pipe markers.

1.2 DEFINITIONS

- A. ABS: Acrylonitrile butadiene styrene.
- B. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.
- C. EPDM: Ethylene-propylene-diene terpolymer.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Section 01 20 00 "Price and Payment Procedures," for Contract Sum/Price modification.
- B. Pipe and Fittings:
 - 1. Basis of Measurement: By linear foot.
 - 2. Basis of Payment: Includes hand trimming, excavation, bedding, pipe, and fittings, to indicated depth and connection to existing sewer.

1.4 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM A123.
- C. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³).

- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³).
- E. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- F. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- G. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- H. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- I. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- J. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- K. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
- L. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- M. ASTM D1784 – Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- N. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- O. Texas Commission on Environmental Quality (TCEQ) 30 TAC Chapter 217 Subchapter C Conventional Collection Systems.

1.5 COORDINATION/MEETINGS

- A. Section 01 30 00 “Administrative Requirements.”
- B. Coordinate this work with City of Midland Water Utilities and Inspection Department.
- C. Notify affected utility companies at least 72 hours prior to construction.

1.6 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures," for requirements.
- B. Product Data: Submit manufacturer information indicating proposed materials, accessories, details, and construction information.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- D. Test and Evaluation Reports: Submit reports indicating field tests made and results obtained.
- E. Manufacturer Instructions:
 - 1. Indicate special procedures required to install specified products.
 - 2. Submit detailed description of procedures for connecting new sewer to existing sewer line and directional drilling installation. pipe jacking installation.
- F. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Qualifications Statement:
 - 1. Submit qualifications for manufacturer and installer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements."
- B. Project Record Documents: Record invert elevations and actual locations of pipe runs, connections, manholes, and cleanouts in a conventional Geographic Information system file format as approved by Engineer.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.8 QUALITY ASSURANCE

- A. Perform Work according to City of Midland and TCEQ standards.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified herein with minimum three years' documented experience.
- B. Installer: Company specializing in performing Work herein with minimum three years' documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements," for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.
- C. Storage:
 - 1. Store materials according to manufacturer instructions.
 - 2. Store valves in shipping containers with labeling in place.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Block individual and stockpiled pipe lengths to prevent moving.
 - 3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SANITARY SEWERAGE PIPING

- A. Plastic Pipe:
 - 1. Material: PVC.
 - 2. Comply with ASTM D3034, SDR-26.
 - 3. Inside Nominal Diameter: 8 and 6 inches.
 - 4. End Connections: Bell-and-spigot style, with rubber-ring-sealed gasket joint.

5. Fittings: PVC.
 6. Joints:
 - a. Elastomeric gaskets.
 - b. Comply with ASTM F477.
- B. Plastic Pipe:
1. Material: PVC, Schedule 40
 2. Comply with ASTM D1785.
 3. Inside Nominal Diameter: 2 inches.
 4. End Connections: Bell-and-spigot style, with solvent-sealed ends.
 5. Fittings:
 - a. Material: PVC.
 - b. Comply with ASTM D2466.
 6. Joints:
 - a. Solvent welded with solvent cement complying with ASTM D2564.
 - b. Comply with ASTM D2855.
- 2.2 MANHOLES
- A. As specified in Sections 33 05 76 "Fiberglass Manholes," as indicated on Drawings.
- 2.3 FLEXIBLE COUPLINGS
- A. Manufacturers:
 1. Fernco, Inc.
 2. Romac Industries Inc.
 3. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- B. Description:
 1. Material: Resilient, chemical-resistant, elastomeric PVC.
 2. Attachment: Two Series-300 stainless-steel clamps, screws, and housings.
- 2.4 CONCRETE ENCASEMENT AND CRADLES
- A. Concrete:
 1. As specified in Section 03 30 00 "Cast-in-Place Concrete."
 2. Strength: 4,000 psi at 28 days.
 3. Air entrained.
 4. Finish: Rough troweled.
- B. Concrete Reinforcement: As specified in Section 03 20 00 "Concrete Reinforcing."
- 2.5 ACCESSORIES
- A. Pipe Markers: As specified in Section 33 05 97 "Identification and Signage for Utilities."
- 2.6 SOURCE QUALITY CONTROL
- A. Section 01 40 00 "Quality Requirements," for testing, inspections, and analysis.
- B. Certificate of Compliance:
 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements." for installation examination.
- B. Verify that trench cut is ready to receive Work of this Section.
- C. Verify that excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements," for installation preparation.
- B. Correct over-excavation in accordance with 31 23 16.13 "Trenching" using Type I, II, or III Soils. Native soil from stockpile may be acceptable if consistent with Type I, II or III soils.
- C. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
- D. Protect and support existing sewer lines, utilities, and appurtenances.
- E. Utilities:
 - 1. Maintain profiles of utilities.
 - 2. Notify Engineer if crossing conflicts occur.

3.3 INSTALLATION

- A. Bedding:
 - 1. Excavate pipe trench as specified in Section 31 23 16.13 "Trenching."
 - 2. Excavate to lines and grades as indicated on Drawings or as required to accommodate installation of encasement.
 - 3. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
 - 4. Provide sheeting and shoring as specified in Section 31 50 00 "Excavation Support and Protection."
 - 5. Provide sheeting and shoring as specified in Section 31 50 00 "Excavation Support and Protection."
 - 6. Placement:
 - a. Place bedding material at trench bottom.
 - b. Level materials in continuous layer not exceeding compacted depths indicated in Section 31 23 23 "Fill."
 - c. Compact to 95 percent of maximum density.
- B. Piping:
 - 1. Install pipe, fittings, and accessories according to ASTM D2321, and seal joints watertight.
 - 2. Lay pipe to slope gradients as indicated on Drawings.
 - 3. Begin at downstream end of system and progress upstream.
 - 4. Bedding: Install at sides and over top of pipe, to minimum compacted thickness of 8 inches.
 - 5. Bedding: As indicated on Drawings.
 - 6. Lay bell-and-spigot pipe with bells upstream.
 - 7. Backfill and compact as specified in Section 31 23 23 "Fill."

8. Do not displace or damage pipe when compacting.
 9. Connect pipe to existing sewer system in accordance with the Drawings.
 10. Pipe Markers: As specified in Section 33 05 97 "Identification and Signage for Utilities."
- C. Manholes: As specified in Section 33 05 76 "Fiberglass Manholes," and as indicated on Drawings.
- D. Wye Branches and Tees:
1. Concurrent with pipe-laying operations, install wye branches and pipe tees at locations indicated on Drawings.
 2. Use standard fittings of same material and joint type as sewer main.
 3. Maintain minimum 5-foot separation distance between wye connection and manhole.
 4. Use saddle wye or tee with stainless-steel clamps for taps into existing piping.
 5. Mount saddles with solvent cement or gasket and secure with metal bands.
 6. Lay out holes with template and cut holes with mechanical cutter.
- E. Sanitary Laterals:
1. Construct laterals from wye branch to terminal point at right-of-way in accordance with Drawings.
 2. Where depth of main pipeline warrants, construct riser-type laterals from wye branch.
 3. Minimum Depth of Cover over Piping: 2 feet.
 4. Minimum Separation Distance between Laterals: 5 feet.
 5. Install watertight plug, braced to withstand pipeline test pressure thrust, at termination of lateral.
 6. Marker Stake:
 - a. Install temporary marker stake extending from end of lateral to 12 inches above finished grade.
 - b. Paint top 6 inches of stake with fluorescent orange paint.
- F. Backfilling: As specified in Section 31 23 23 "Fill."

3.4 TOLERANCES

- A. Section 01 40 00 "Quality Requirements."
- B. Maximum Variation from Indicated Slope: +/- 0.01 percent.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements," for inspecting and testing.
- B. Section 01 70 00 "Execution and Closeout Requirements," for testing, adjusting, and balancing.
- C. Testing:
 1. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest. All pipe to have a Low-Pressure Air Test, Infiltration Test, and/or Exfiltration Test as directed by Engineer.
 2. Perform testing on Site sanitary sewage system according to City of Midland and TCEQ standards.
 3. Pipe Testing:
 - a. Pressure Testing: As specified in Section 33 05 05.41 "Air Testing," and as required by the City of Midland.
 - b. Deflection Testing: As specified in Section 33 05 05.43 "Mandrel Testing," and as required by the City of Midland.
 4. Manhole Testing:

- a. Infiltration/Exfiltration Testing: As specified in Section 33 05 05.36 "Vacuum Testing."

3.6 PROTECTION

- A. Section 01 70 00 "Execution and Closeout Requirements."
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
- C. Cap open ends of piping during periods of Work stoppage.

END OF SECTION

SECTION 40 05 78.13 - AIR/VACUUM VALVES FOR WATER SERVICE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Air release/vacuum breaker valves for water utilities.
- B. Related Requirements:
 - 1. Division 01 Specification Sections apply to Work of this Section.

1.2 REFERENCE STANDARDS

- A. American Water Works Association:
 - 1. AWWA C512 - Air Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
- B. ASME International:
 - 1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - 2. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
- C. ASTM International:
 - 1. ASTM A536 - Standard Specification for Ductile Iron Castings.
- D. International Organization for Standardization:
 - 1. ISO 9001 - Quality Management Systems.
- E. NSF International:
 - 1. NSF 61 - Drinking Water System Components - Health Effects.
 - 2. NSF 372 - Drinking Water System Components - Lead Content.

1.3 COORDINATION

- A. Section 01 30 00 "Administrative Requirements": Requirements for coordination.
- B. Coordinate Work of this Section with installation of process piping.

1.4 SUBMITTALS

- A. Section 01 33 00 "Submittal Procedures": Requirements for submittals.
- B. Product Data: Submit manufacturer catalog information.
- C. Shop Drawings: Indicate materials, dimensions, weights, and end connections on assembly drawings.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer Instructions: Submit special procedures and setting dimensions.
- F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.
- G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- H. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
- I. Qualifications Statements:
 - 1. Submit qualifications for manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for submittals.
- B. Project Record Documents: Record actual locations of air release/vacuum breaker valves.

1.6 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.
- B. Manufacturer Quality Management System: Certified to ISO 9001.
- C. Perform Work according to City of Midland and TCEQ standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 "Product Requirements": Requirements for transporting, handling, storing, and protecting products.
- B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- C. Store materials according to manufacturer instructions.
- D. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
 - 3. Provide additional protection according to manufacturer instructions.

1.9 EXISTING CONDITIONS

- A. Field Measurements:
 - 1. Verify field measurements prior to fabrication.
 - 2. Indicate field measurements on Shop Drawings.

1.10 WARRANTY

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for warranties.
- B. Furnish one-year manufacturer's warranty for air release/vacuum breaker valves.

PART 2 - PRODUCTS

2.1 AIR/VACUUM VALVES FOR WATER SERVICE

- A. Manufacturers:
 - 1. CLA-VAL Automatic Control Valves.
 - 2. Flomatic Corporation.
 - 3. Val-Matic Valve & Manufacturing Corp.

- B. Substitutions: As specified in Section 01 60 00 "Product Requirements."
- C. Furnish materials according to City of Midland and TCEQ standards.

2.2 SOURCE QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements": Requirements for testing, inspection, and analysis.
- B. Provide shop inspection and testing of completed assembly.
- C. Certificate of Compliance:
 - 1. If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation examination.
- B. Verify that field dimensions are as indicated on Drawings.
- C. Inspect existing flanges for nonstandard bolt hole configurations or design and verify that new pipe and flanges mate properly.

3.2 PREPARATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for installation preparation.
- B. Thoroughly clean end connections before installation.
- C. Close pipe and equipment openings with caps or plugs during installation.
- D. Surface Preparation: Clean surfaces to remove foreign substances.

3.3 INSTALLATION

- A. According to manufacturer instructions.
- B. Provide access for operation, removal, and maintenance, and to avoid discharge to occupied areas or other equipment.
- C. Installation Standards: Install Work according to City of Midland, TCEQ and Texas Department of Transportation standards.

3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 "Quality Requirements": Requirements for inspecting and testing.

3.5 CLEANING

- A. Keep interior of air release valves clean as installation progresses.

3.6 DEMONSTRATION

- A. Section 01 70 00 "Execution and Closeout Requirements": Requirements for demonstration and training.
- B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION